

U. S. DEPARTMENT OF THE INTERIOR
PROTOTYPE OIL SHALE LEASING PROGRAM

TRACT
TRACT C-b

QUARTERLY REPORT #3

(Through May 31, 1975)

BLM Library
D-553A, Building 50
Denver Federal Center
P. O. Box 25047
Denver, CO 80225-0047

Submitted to:

Mr. Peter A. Rutledge
Area Oil Shale Supervisor
Conservation District
U. S. Geological Survey
Grand Junction, Colorado

By:

Ashland Oil, Inc.
Atlantic Richfield Company
Shell Oil Company, Operator
The Oil Shale Corporation

JULY 15, 1975



TABLE OF CONTENTS BY VOLUME NUMBER

<u>Volume Number</u>	<u>Table of Contents</u>
I	I. PRE-EXPLORATION ENVIRONMENTAL RECONNAISSANCE SURVEYS
	II. ENVIRONMENTAL BASELINE MONITORING PROGRAMS
	A. Surface Water
	1. Streams
	2. Springs and Seeps
	B. Core Drilling and Associated Ground Water
	1. Well Survey Plats
	2. Completion Data
	3. Drilling Water Production
	4. Water Quality - Drilling Water
	5. Water Quality - Baseline Monitoring
	6. Water Quality - Aquifer Pump Tests
	7. Aquifer Data - Jetting Tests
I, II, III & IV	8. Aquifer Data - Drillstem Tests, Multipacker Tests, and Mini-Pump Test
V	9. Aquifer Data - Pumping Tests
VI & VII	10. Lithologic Logs
VIII	11. Geophysical Logs
IX	12. Assays
	13. Core and Cuttings Trace Element Analysis
	14. Rock Mechanics
	15. Core Gas Samples
X, XI, XII, XIII, XIV & XV	C. Air Quality
	1. Air Quality and Surface Meteorology
	2. Low Altitude Meteorology
	3. Upper Air Studies
	4. Visibility
	5. Atmospheric Diffusion Studies
XVI	D. Biology
	1. Terrestrial Wildlife Studies
	2. Aquatic Studies
	3. Terrestrial Vegetation Studies
	4. Dendrochronology and Dendroclimatology Studies
	5. Soil Survey and Productivity Assessment Studies
XVII	III. OTHER STUDIES
	A. Fish and Wildlife Management Plan
	B. Revegetation Studies
	C. Microenvironmental Studies
	D. Aerial Photographic Study
	E. Archaeological Studies
	F. Scenic Values Study

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

1943-1944

Alluvial Well Pump Test

Alluvial Well Pump Test

II B-9 AQUIFER DATA - PUMPING TESTS

Lower Aquifer Pumping Test

Quarterly Report #2 contains a detailed description of the objectives and history of the upper zone phase of the aquifer pumping test at AT-1. It was stated that the upper zone test was terminated in mid-January when a drilling rig was brought back to the site, and AT-1 deepened. This action, in fact, began the preparation for testing the lower zone. The test well AT-1 was drilled to the base of the mine zone and casing was installed and cemented in place. The well was then drilled an additional 270 feet, downward into the "lower zone aquifer." A pump with water production capability of 150 gallons per minute was installed at a depth of 1430 feet below ground surface. (It was determined during the deepening of AT-1 that the lower aquifer could not sustain rates in excess of 150 gpm. The upper aquifer, by comparison, was capable of yielding greater than 400 gpm.)

Water produced during the deepening operation had a relatively low dissolved solids content, 1500 mg/l and a fluoride content of approximately 20 mg/l. This was similar in character to waters directly above the Mahogany zone in the upper aquifer. During the test, fluoride and boron levels averaged 20 mg/l and 1 to 2 mg/l, respectively. During the lower zone test, the dissolved solids content of production water never exceeded 1200 mg/l.

Background pressure readings were taken for several days before the test was actually commenced. Almost immediately, however, an equipment problem forced a restart. After restart, the test well maintained a rate of approximately 120 gpm for 17 days. At that time, the generator unit failed and the initial pumping phase of the test was terminated. A recovery period lasted for eight days and was followed by a pulse-pumping phase before final shut-in. A complete chronology of events for the lower aquifer test is given in Table II B-51.

An overview of pressure response data generated during the lower aquifer test revealed that strong anisotropic or directional permeability exists. The orientation of this anisotropy in the lower aquifer can be described as following the general direction of AT-1 to SG-6. This is approximately normal to the directional permeability shown in the upper zone test. Computer analysis has not been initiated as yet because pressure data are still being reduced and will not be available in suitable format for some time. Manual plots and interpretation of the pressure responses in the lower aquifer, however, have yielded transmissivity values as shown in Tables II B-52 and II B-53. More complete permeability values are being calculated by the Leasee's reservoir simulation group.

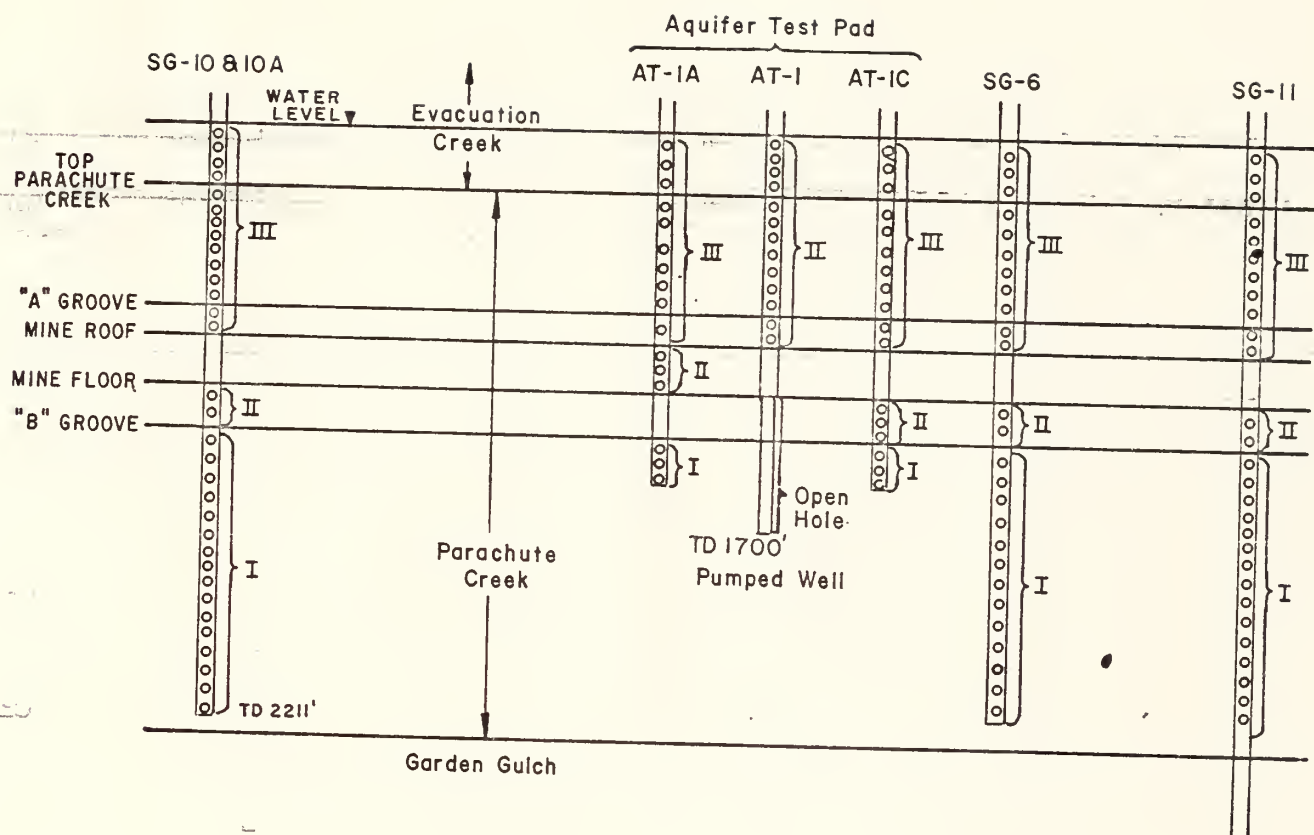




Figure
II B-14

SCHEMATIC CROSS-SECTION LOWER AQUIFER PUMP TEST

C-b TRACT, COLORADO

SCALE: None

 Perforated Interval

 II Tubing String Number

TEST RESULTS					TEST DATE	
NO.	TEST	RESULT	UNIT	REMARKS	DATE	TIME
1	TEST 1	100	100			
2	TEST 2	100	100			
3	TEST 3	100	100			
4	TEST 4	100	100			
5	TEST 5	100	100			
6	TEST 6	100	100			
7	TEST 7	100	100			
8	TEST 8	100	100			
9	TEST 9	100	100			
10	TEST 10	100	100			

100% PASS
 100% PASS
 100% PASS

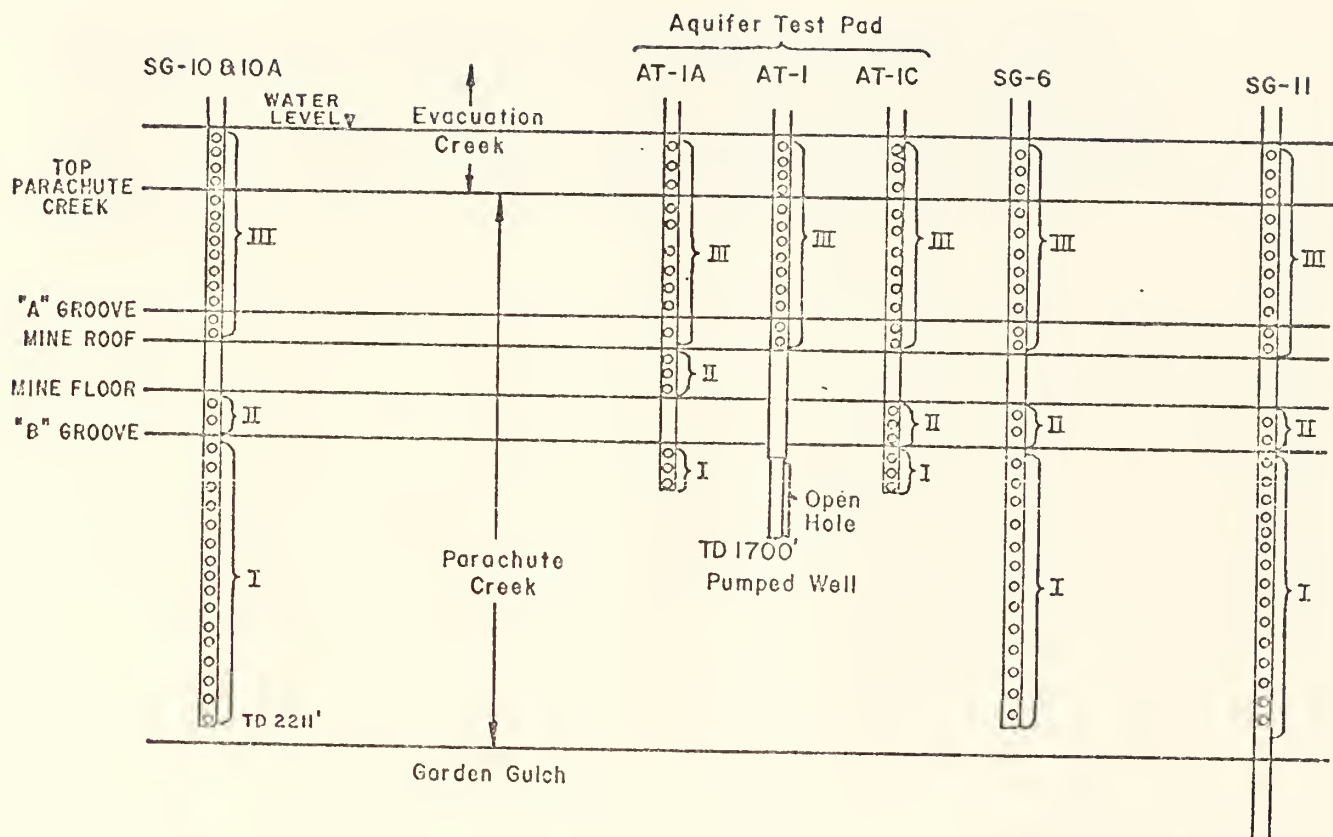
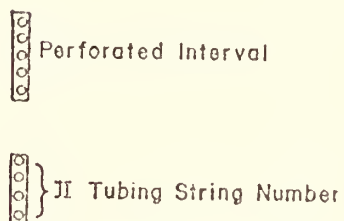


Figure II B-14

SCHEMATIC CROSS-SECTION
LOWER AQUIFER PUMP TEST
C-b TRACT, COLORADO

SCALE: None



Date		Time		Location		Remarks	
10-20-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-21-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-22-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-23-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-24-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-25-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-26-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-27-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-28-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-29-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-30-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30
10-31-20	10:00	10:15	10:30	10:45	11:00	11:15	11:30

With respect to potential aquifer interconnection, it was observed that pressure gauges in the upper zone showed no response to the pumping in the lower zone, in spite of large drawdown of lower aquifer water levels during the pumping of AT-1. Water levels in the upper aquifer continued to recover throughout the lower zone test. This is an expected response, if the two aquifer systems are hydraulically separated by the Mahogany zone; water levels in the upper zone would be expected to recover or rise as a response to the termination of pumping of the upper aquifer.

Supplemental graphs have been provided which illustrate the manual data interpretation conducted to date (Pages II B-1088 through II B-1157). Pressure (psi) is plotted versus time for each of the well strings monitored during the lower zone tests. Additional data in the form of computer reduced water level responses and pressure responses is currently being generated and is not available for reporting.

TABLE II B-51
LOWER AQUIFER PUMP TEST

Sequence of Events

6-hour surge test drawdown (systems test) 2-5-75 (12 P.M.-6 P.M.)

surge test recovery 2-5-75 (6 P.M.) to 2-15-75 (5:20 P.M.)

Original start of drawdown 2-15-75 (5:20 P.M.) to 2-17-75 (12:45 P.M.)

(generator failure)

Recovery Period 2-17-75 (12:45 P.M.) to 2-21-75 (12:00 P.M.)

Initial drawdown 2-21-75 (12:00 P.M.) to 3-10-75 (10:00 A.M.)

17 days pumping

Initial recovery 3-10-75 (10:00 A.M.) to 3-18-75 (12:00 P.M.)

8 days shut in

Pulse test drawdown 3-18-75 (12:00 P.M.) to 3-26-75 (12:00 P.M.)

8 days pumping

Final recovery 3-26-75 (12:00 P.M.) to 4-15-75 (12:00 P.M.)

20 days shut in

Pulled pump and instruments 4-15-75

Set up limited data collection network in AT1-c, SG-6, SG-10, and SG-11
5-7-75 through 5-14-75 changed upper strings to Stevens digital
recorders, lower and middle strings using pressure monitor on Sperry
systems.

LOWER AQUIFER PUMP TEST
DRAWDOWN AND RECOVERY CURVES

TABLE II B-52

TRANSMISSIVITY AND STORAGE COEFFICIENT VALUES

LOWER AQUIFER PULSE TEST - DRAWDOWN PHASE

WELL NO.	DRAWDOWN COMPUTATIONS	Horizontal Permeability
AT-1	T = 359 gpd/ft. early stage T = 532 gpd/ft. middle stage T = 756 gpd/ft. final stage	153.5 millidarcys
AT-1A (String #1)	T = 465; S = 5×10^{-4}	94.4 millidarcys
AT-1A (String #2)	Interpretative technique is not applicable	
AT-1C (String #1)	T = 219; S = 5×10^{-5} early stage Instrument drift during final stage	
AT-1C (String #2)	T = 316; S = 2×10^{-5} early stage T = 513; S = 6×10^{-7} final stage	104.2 millidarcys
AT-1D (String #2)	T = 271; S = 3×10^{-5} early stage T = 327; S = 7×10^{-7} final stage	66.4 millidarcys
SG-6 (String #1)	Slight downward response	
SG-6 (String #2)	T = 442; S = 8×10^{-5} final stage	89.7 millidarcys
SG-10 (String #1)	T = 1468; S = 2×10^{-4} T = 811; S = 1×10^{-4}	164.6 millidarcys
SG- (String #2)	No response	
SG-11 (String #1)	No response	
SG-11 (String #2)	Overall downward trend	



TABLE II B-53

TRANSMISSIVITY and STORAGE COEFFICIENT VALUES

LOWER AQUIFER PUMP TEST

Well No.	Initial Drawdown	Initial Recovery
AT #1	T = 310 g/d/ft. Initial T = 460 Secondary T = 380 Tertiary	T = 160 g/d/ft. Initial T = 320 Secondary
AT #1A (String #1)	T = 441; S = 3.11×10^{-4} T = 338; S = 4.56×10^{-4}	T = 435; S = 5.64×10^{-4} T = 335; S = 8.11×10^{-4}
AT #1A (String #2)	No Valid Response	No Valid Response
AT #1C (String #1)	T = 129; S = 1.52×10^{-4} T = 260; S = 2.24×10^{-5}	T = 1125; S = 1.80×10^{-4} T = 255; S = 3.22×10^{-5}
(String #2)	T = 173; S = 5.82×10^{-5} T = 275; S = 2.04×10^{-5} T = 376; S = 3.77×10^{-6}	T = 157; S = 9.44×10^{-5} T = 340; S = 1.98×10^{-5}
AT #1D (String #1)	T = 143; S = 1.08×10^{-4} T = 348; S = 8.63×10^{-6}	T = 136; S = 1.18×10^{-4} T = 325; S = 2.14×10^{-5}
SG - 6 (String #1)	T = 1430; S = 4.52×10^{-4} T = 620; S = 3.87×10^{-4}	T = 2800; S = 7.38×10^{-4}
(String #2)	T = 1520; S = 6.86×10^{-5} T = 574; S = 5.62×10^{-5} T = 305; S = 6.66×10^{-5}	T = 400; S = 7.53×10^{-5}
SG - 10 (String #1)	T = 490; S = 6.06×10^{-5}	T = 950; S = 1.13×10^{-4} T = 846; S = 1.11×10^{-4}
(String #2)	No Response	Very Slight Downward Response
SG - 11 (String #1)	No Response	No Response
(String #2)	T = 1065; S = 1.69×10^{-3}	No Recovery-Downward Response



Time in hours since pump turned off.



$$T_1 = \frac{264Q}{2.5}$$

$$\Delta S = 315 - 227 = 88 = 203.3'$$

$$= \frac{264 \times 125}{20.3}$$

$$T_1 = 1609 \text{ d/ft}$$

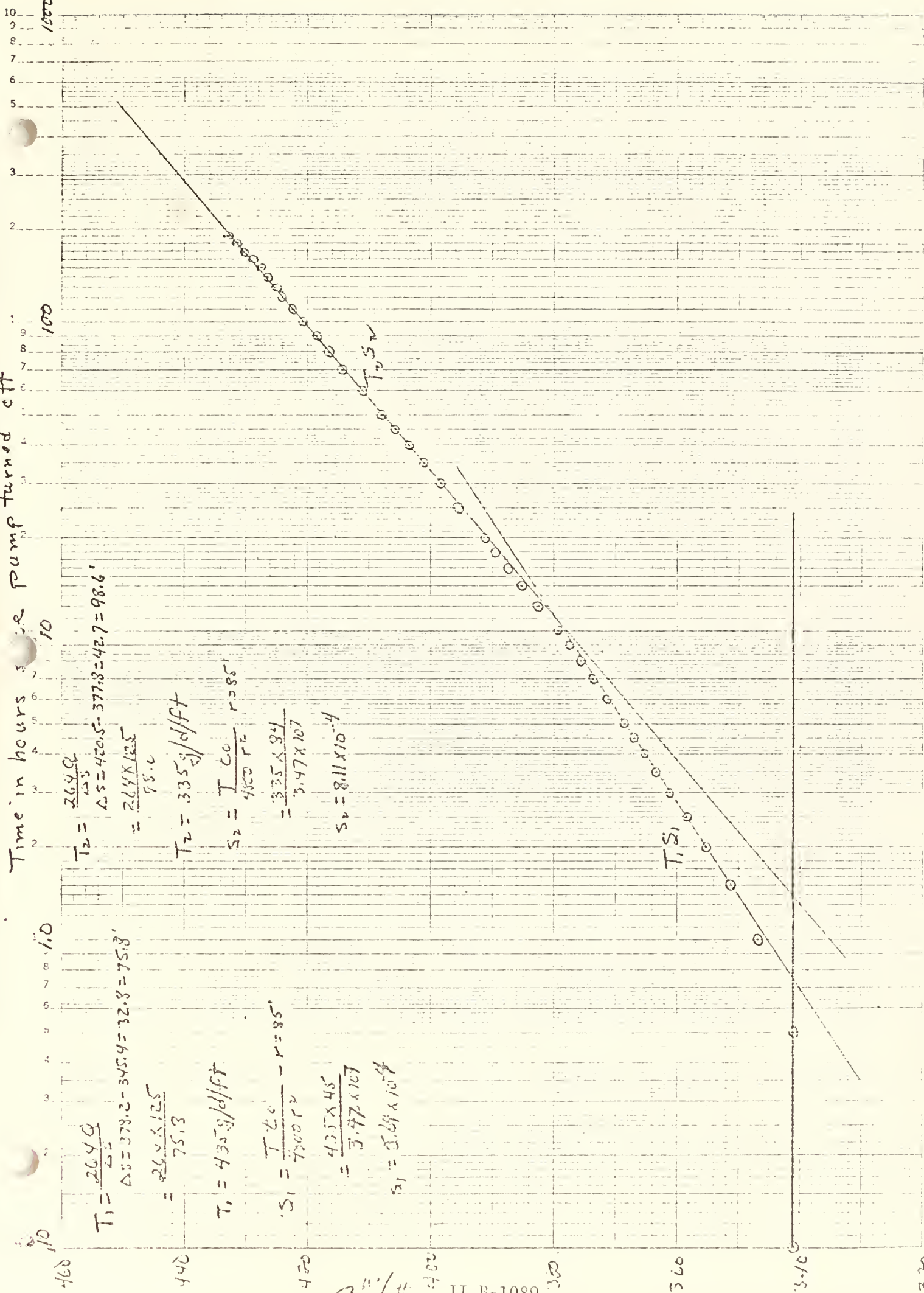
$$T_2 = \frac{264Q}{2.5}$$

$$\Delta S = 352 - 307 = 45 = 104'$$

$$= \frac{264 \times 125}{10.1}$$

$$T_2 = 3209 \text{ d/ft}$$

Time in hours since pump turned off



$$T_2 = \frac{2640}{\Delta S} = \frac{2640}{420.5 - 377.8} = 42.7 = 98.6'$$

$$= \frac{264 \times 125}{98.6}$$

$$T_2 = 335 \text{ g/d/ft}$$

$$S_2 = \frac{T_2 C}{4800 r^2} = \frac{335 \times 94}{3.47 \times 10^7}$$

$$S_2 = 8.11 \times 10^{-4}$$

$$T_1 = \frac{2640}{\Delta S} = \frac{2640}{378.2 - 345.4} = 32.8 = 75.3'$$

$$= \frac{264 \times 125}{75.3}$$

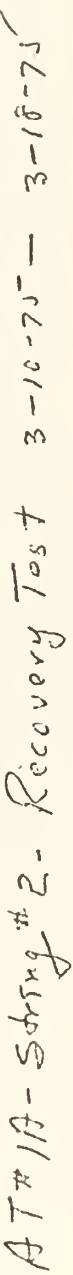
$$T_1 = 435 \text{ g/d/ft}$$

$$S_1 = \frac{T_1 C}{7900 r^2} = \frac{435 \times 48}{3.47 \times 10^7}$$

$$S_1 = 5.64 \times 10^{-4}$$

AT #1 A - String #1 Recovery Test 3-10-75 - 3-18-75

Time in hours since put off



Time in hours since pump turned off

400 10 100 1000

$$T_1 = \frac{2649}{25}$$

$$DS = 364 - 237 = 127 = 213.4$$

$$= \frac{2649 \times 125}{293.7}$$

$$T_1 = 112.5 \text{ g/d/ft}$$

$$S_1 = \frac{T_1}{4300 \times 10^2} \quad r = 102$$

$$= \frac{112.5 \times 798}{497 \times 10^7}$$

$$S_1 = 1.30 \times 10^{-4}$$

$$T_2 = \frac{2649}{25}$$

$$DS = 419 - 363 = 56 = 128.4$$

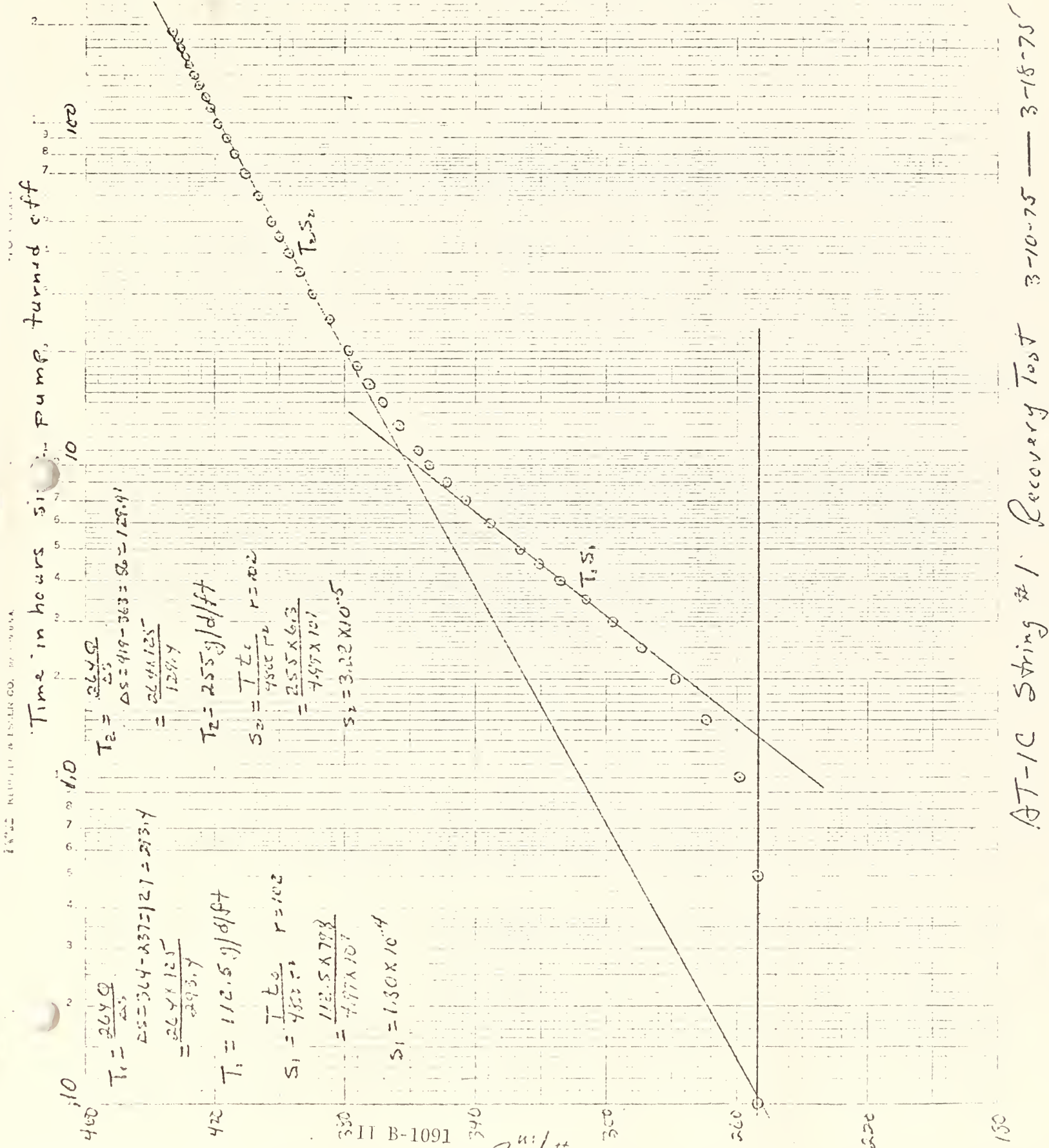
$$= \frac{2649 \times 125}{128.4}$$

$$T_2 = 255 \text{ g/d/ft}$$

$$S_2 = \frac{T_2}{4300 \times 10^2} \quad r = 102$$

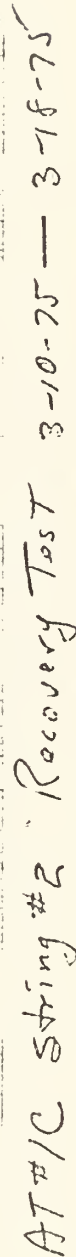
$$= \frac{255 \times 6.3}{497 \times 10^7}$$

$$S_2 = 3.22 \times 10^{-5}$$



AT-1C String #1. Recovery Test 3-10-75 — 3-18-75

10
3



Time in hours since pump Turned off

10 9 8 7 6 5 4 3 2 1 0

$$T_1 = \frac{2640}{2.5}$$

$$\Delta S = 346 - 245 = 105 = 242.6'$$

$$= \frac{2640 \times 125}{242.6}$$

$$T_1 = 136.9 \text{ d/ft}$$

$$S_1 = \frac{T_1 t_c}{4520 r^2} \quad r = 127'$$

$$= \frac{136.9 \times 127.2}{4520 \times 12129}$$

$$S_1 = 1.18 \times 10^{-4}$$

$$T_2 = \frac{2640}{2.5}$$

$$\Delta S = 384 - 340 = 44 = 101.6'$$

$$= \frac{2640 \times 125}{101.6}$$

$$T_2 = 325.9 \text{ d/ft}$$

$$S_2 = \frac{T_2 t_c}{4520 r^2} \quad r = 127'$$

$$= \frac{325.9 \times 51.1}{7794107}$$

$$S_2 = 2.14 \times 10^{-5}$$

100

T₂S₂

T₁S₁

t_c = 0.85

AT#1D - Spring #1 Recovery Test 3-10-75 — 3-18-75



Time in hours since pump turned off

10 9 8 7 6 5 4 3 2 1 100 1000

$$T = \frac{264 \text{ GP}}{2.3}$$

$$\Delta S = 432.8 - 477.7 = 511 = 11.3'$$

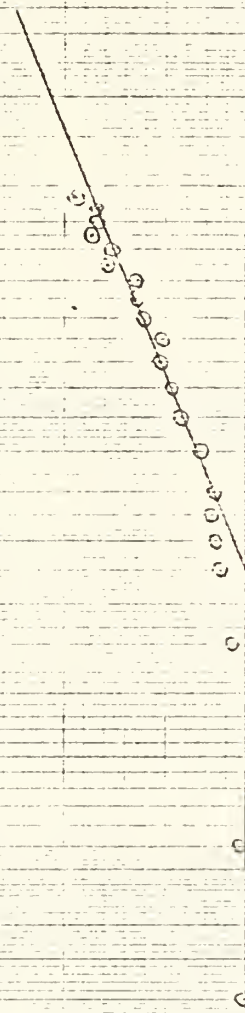
$$= \frac{264 \times 1.25}{11.3}$$

$$T = 2800 \text{ g/d/ft}$$

$$S = \frac{T \cdot L}{400 \cdot r} \quad r = 12891$$

$$= \frac{2800 \times 2100}{400 \times 12891}$$

$$S = 7.38 \times 10^{-4}$$



Time in hours since pump turned off

430

$$T = \frac{26.4 \times 10^4}{125}$$

$$\Delta S = 401.8 - 372.3 = 35.5 = 82.0'$$

$$= \frac{26.4 \times 125}{82}$$

$$T = 400.9 / d / ft$$

$$S = \frac{T}{400.9} \quad r = 1289$$

$$= \frac{36.4 \times 10^4}{9.97 \times 10^4}$$

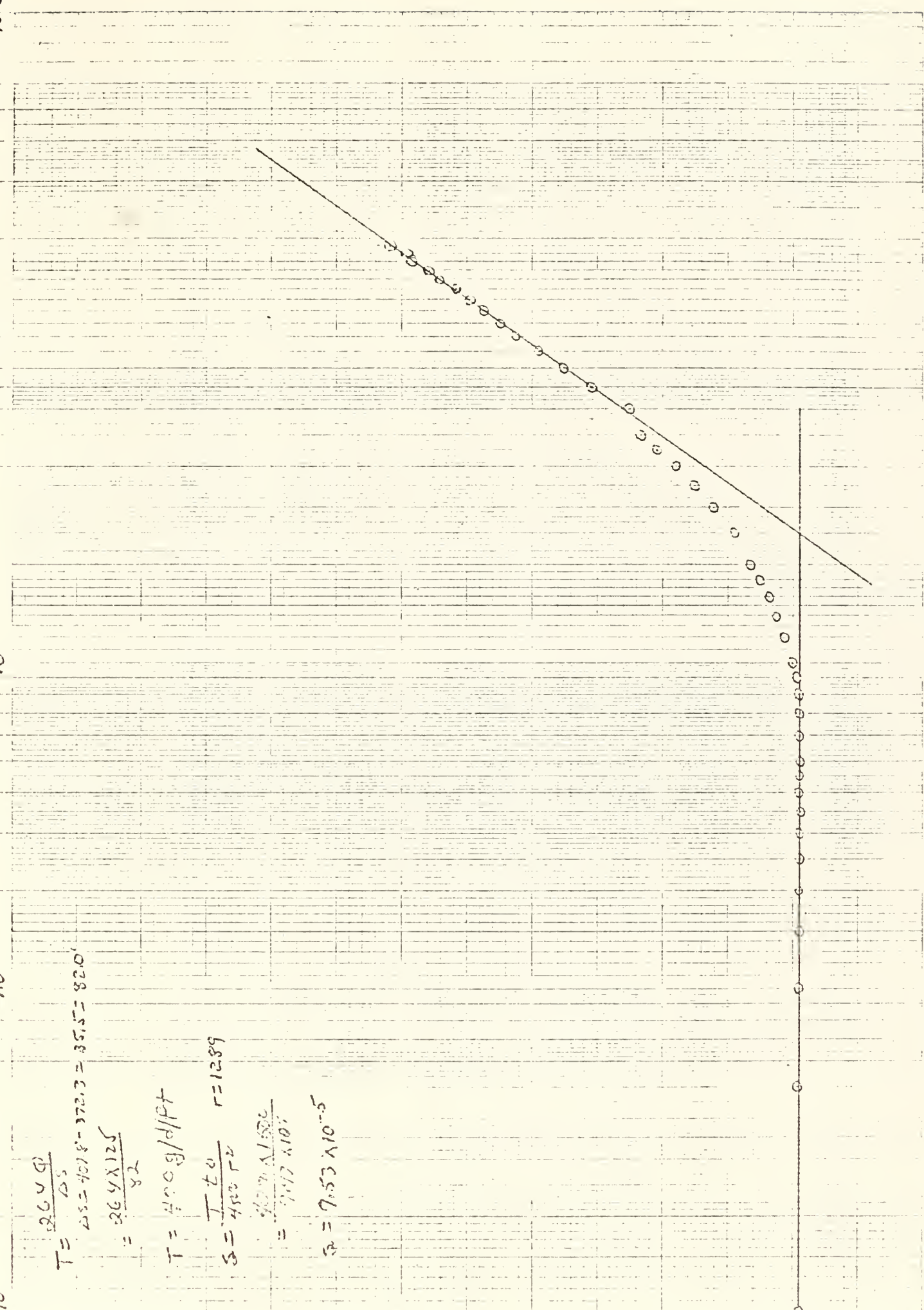
$$S = 7.53 \times 10^{-5}$$

11 B-1095

390

330

370



SG-6 String #2 Recovery Test 3-10-75 — 3-18-75

Time in hours since pump turned off

10

10

10

100

100

$$T = \frac{2640}{\Delta S}$$

$$\Delta S = 43.5 - 420.4 = 15 = 34.7'$$

$$= 2640 \times 12.5$$

$$= 34.7$$

$$T = 7508/415$$

$$S = \frac{T t_0}{480 r^2} \quad r = 2334$$

$$= \frac{952 \times 3120}{4800 \times 2334^2}$$

$$S = 1.13 \times 10^{-4}$$

$$T_2 = \frac{2640}{\Delta S}$$

$$\Delta S = 16.9 \text{ ft} = 39.0 \text{ ft.}$$

$$= \frac{2640 \times 12.5}{59}$$

$$= 846 \text{ gms/ft}$$

$$S = \frac{T t_0}{480 r^2} \quad t_0 = 56 \text{ hrs} = 3360 \text{ min}$$

$$S = \frac{846 (3360)}{4800 (2334)^2}$$

$$S = 1.11 \times 10^{-4}$$

11 B-1096

430

420

SG-10 String #1 Recovery Test 3-10-75 - 3-18-75



turned off

Time in hours since pump

10

9

8

7

6

5

4

3

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

50

25

10

5

2

1

0

1000

200

100

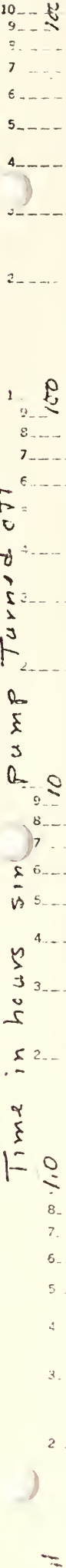
50

25

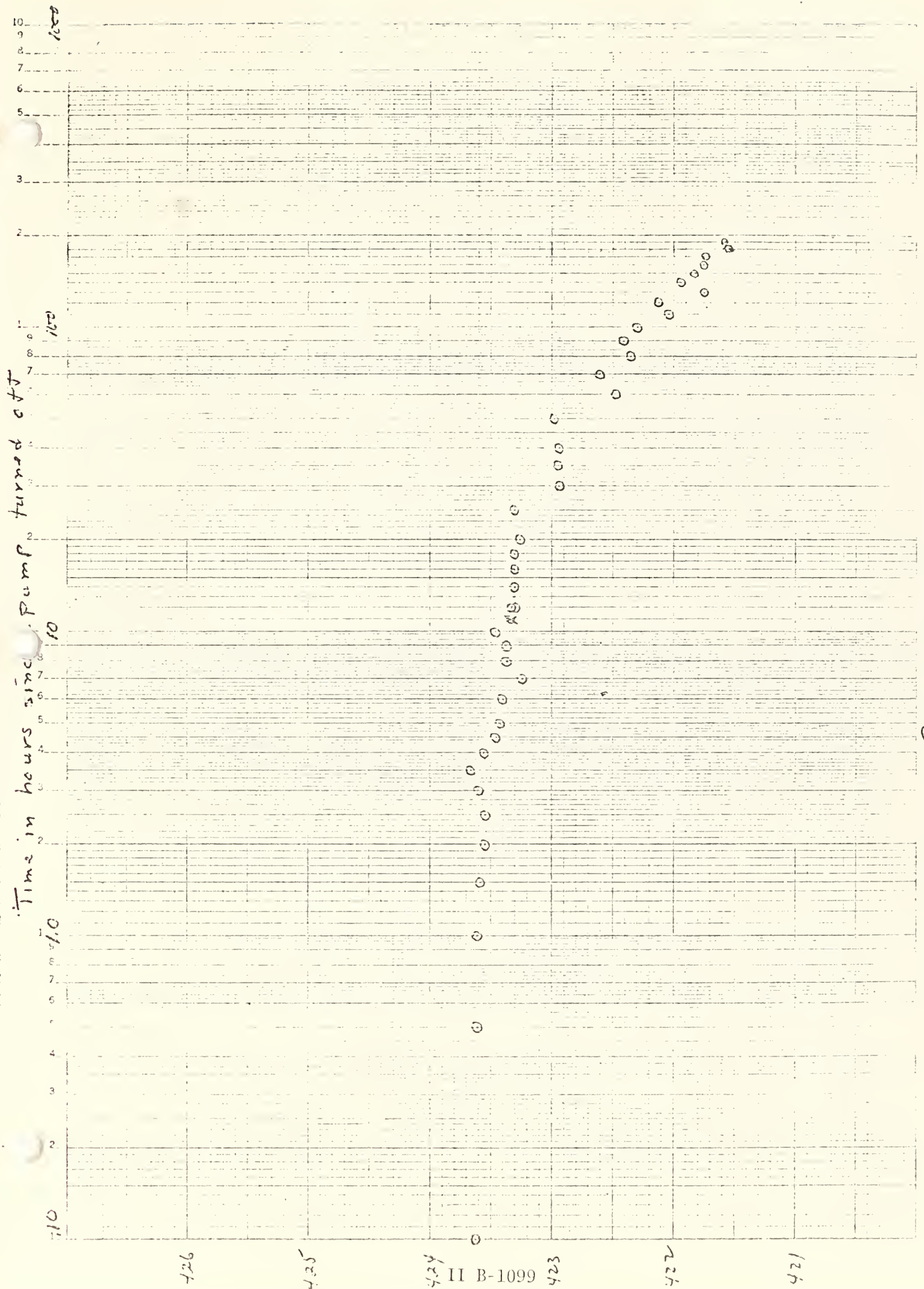
10

5

Time in hours since Pump Turned off

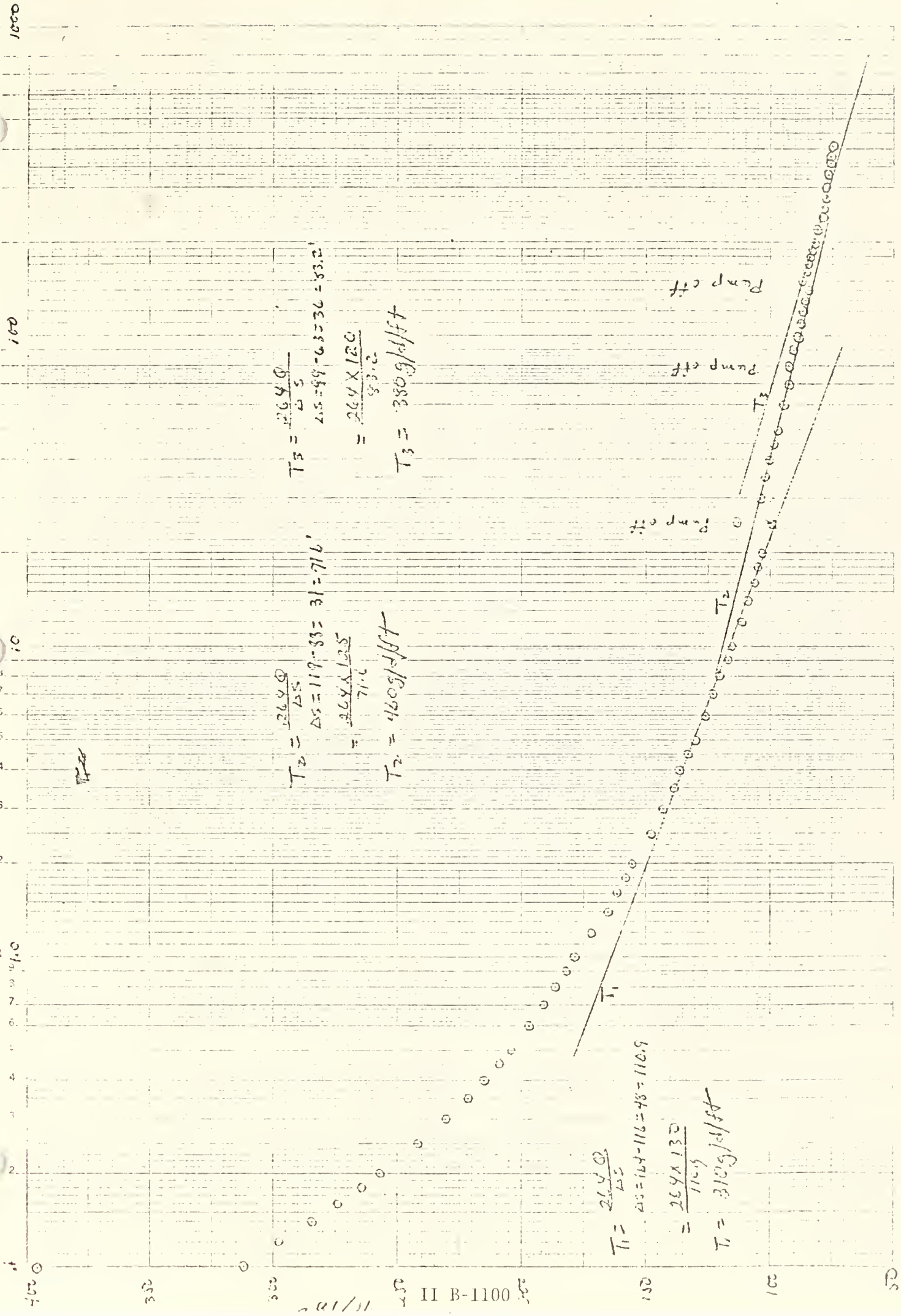


56-11 String #1 Recovery Test 3-10-75 — 3-18-75



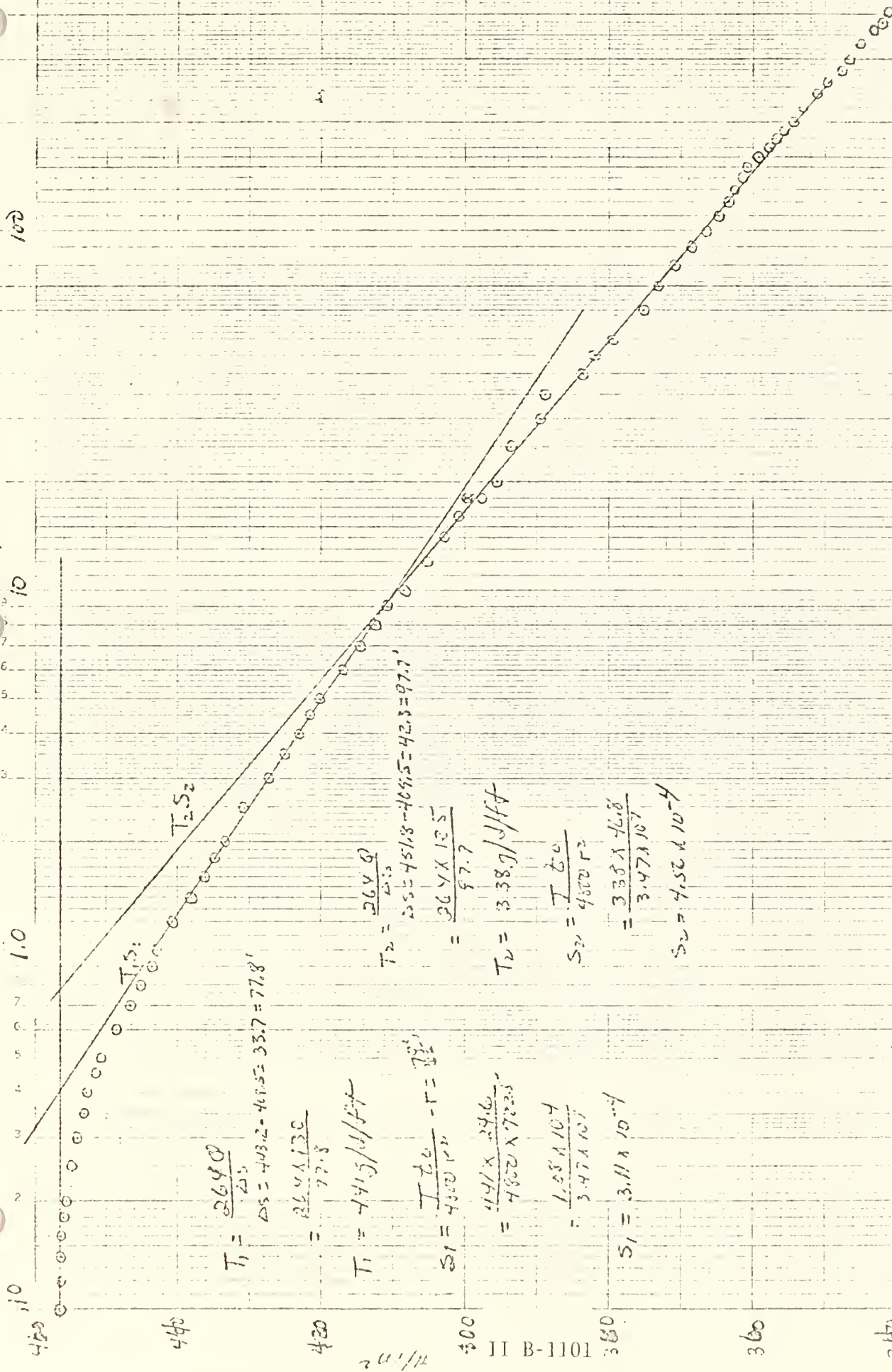
5.6-11 string #2 Recovery Test 3-10-75

Time since pump turn on in hours



AT #1 - Draw down test. 2-24-75 - 3-10-75

Time in hours since pump turned on



AT-1A-String #1 Drawdown Test - 2-28-75 - 3-10-75

Time in hours since pump turned on

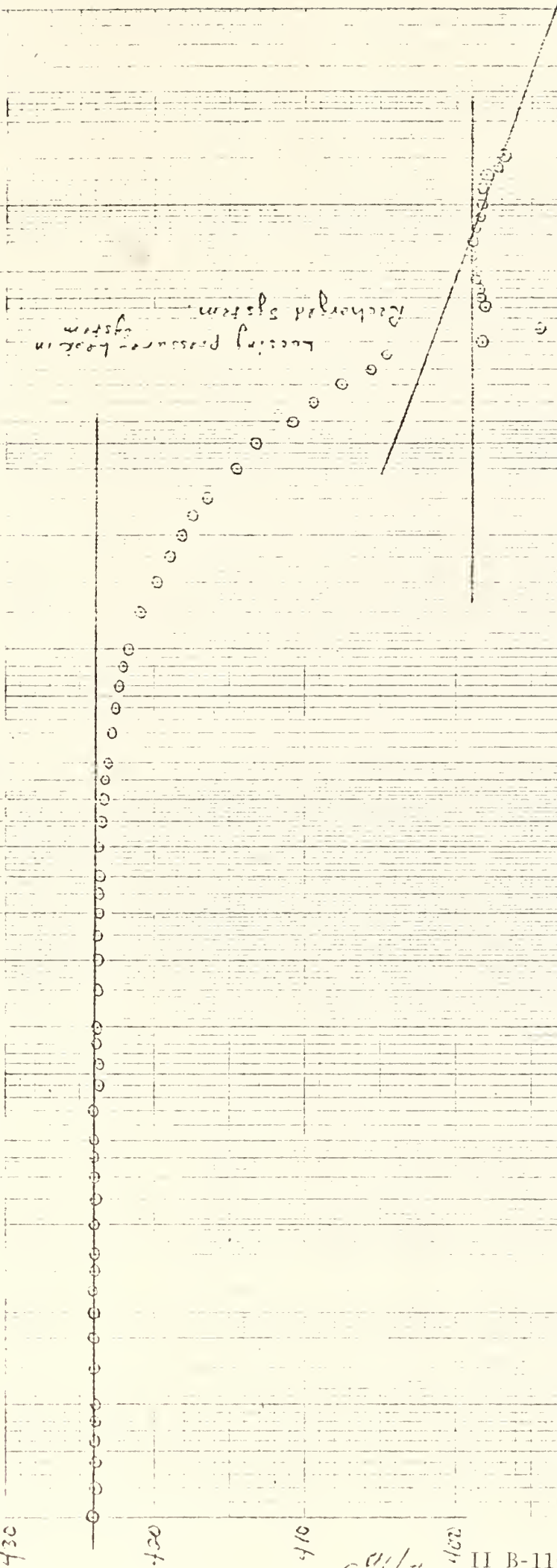
10

1.0

10

100

Leaking pressure look in
Recharged system



$$T = \frac{400}{400 - 343.4} = 21.5$$

$$S = \frac{15.35 \times 14.7}{400 \times 7.225}$$

$$T = 15.35 \text{ g/dft?}$$

$$S = \frac{15.35 \times 14.7}{400 \times 7.225} = 85$$

$$S = 6.37 \times 10^{-1}$$

Data
Determined -
leak's in
system

Time in hours since pump turned on.

1000

100

10

100

3

2

1

0

0

0

0

0

0

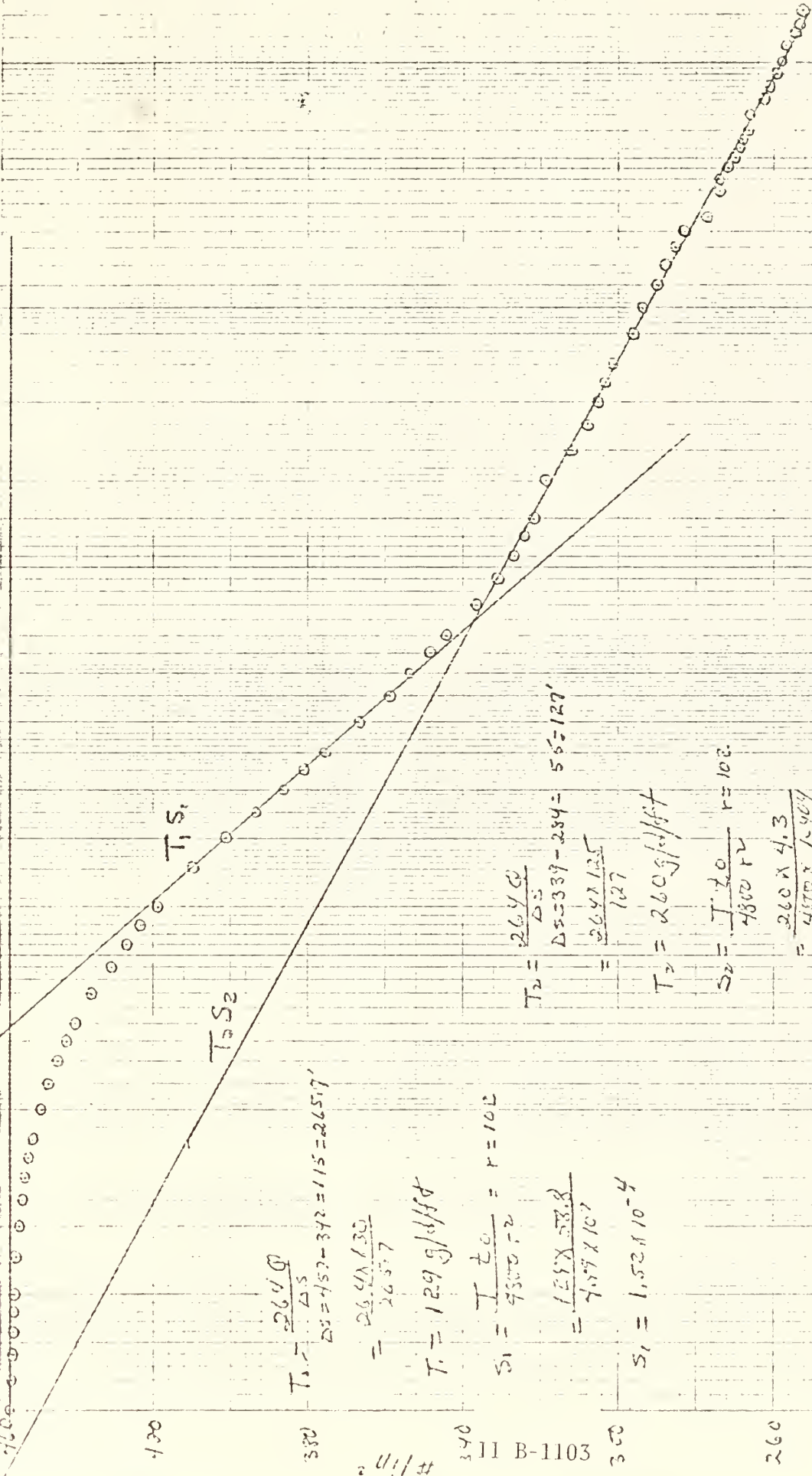
0

0

0

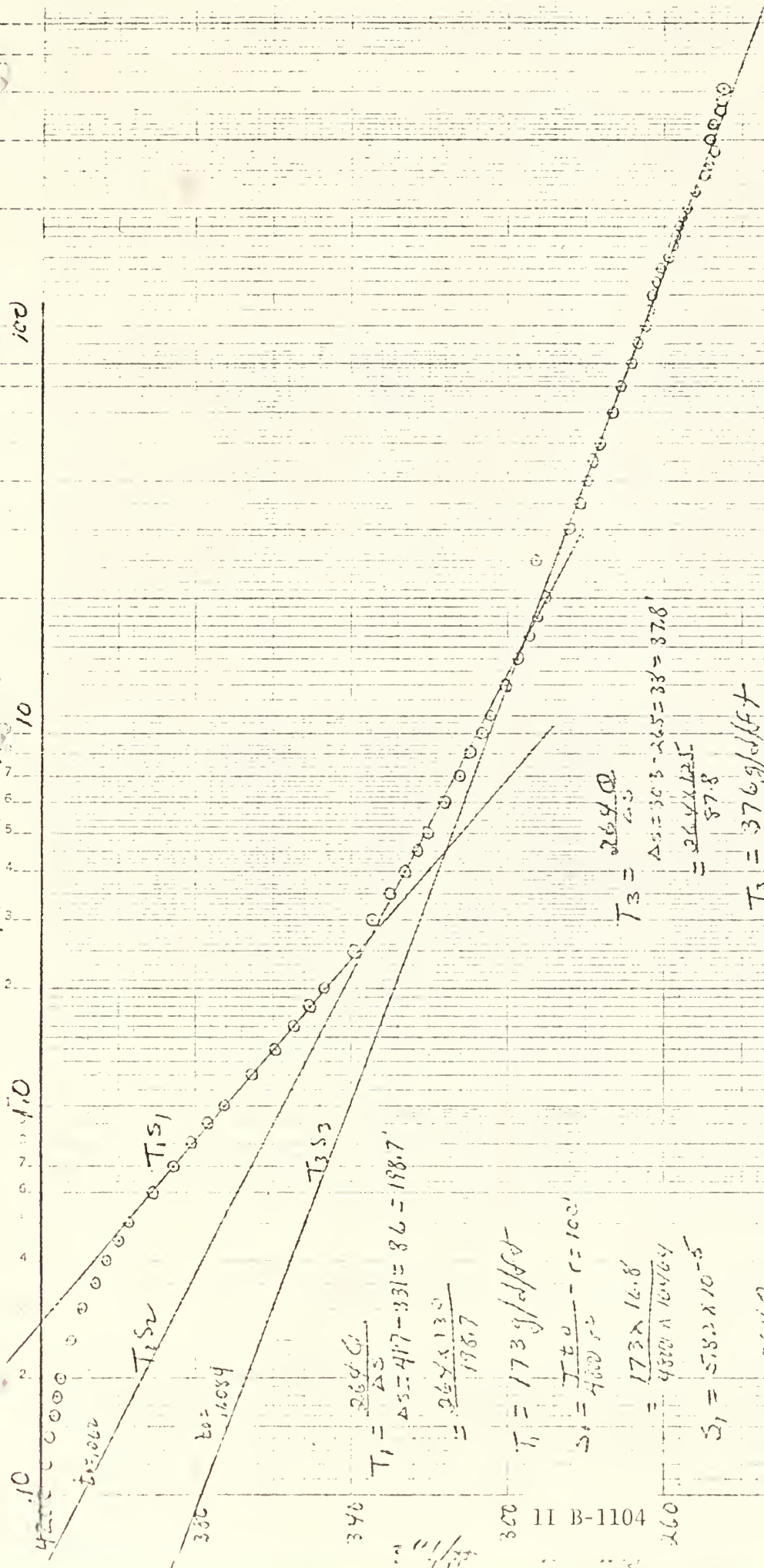
0

0



AT#1/C - string #1 Drawdown test 2-21-75 - 3-10-75

Time in hours since pump turned on.



$$T_1 = \frac{2640}{\Delta S}$$

$$\Delta S = 417 - 331 = 86 = 198.7'$$

$$= \frac{2640 \times 130}{198.7}$$

$$T_1 = 173 \text{ g/eff}$$

$$S_1 = \frac{T_1 \cdot r}{4800 \cdot r^2} - r = 100'$$

$$= \frac{173 \times 16.8'}{4800 \times 10464}$$

$$S_1 = 5.82 \times 10^{-5}$$

$$T_2 = \frac{2640}{\Delta S} = \frac{358 - 306}{120.1'} = 52 = 120.1'$$

$$T_2 = 275 \text{ g/eff}$$

$$S_2 = \frac{T_2 \cdot r}{4800 \cdot r^2} - r = 102'$$

$$= \frac{275 \times 3.7}{4.49 \times 107}$$

$$S_2 = 2.04 \times 10^{-5}$$

$$T_3 = \frac{2640}{\Delta S}$$

$$\Delta S = 303 - 265 = 38 = 37.8'$$

$$= \frac{2640 \times 125}{37.8}$$

$$T_3 = 376 \text{ g/eff}$$

$$S_3 = \frac{T_3 \cdot r}{4800 \cdot r^2}$$

$$= \frac{376 \times 150}{4800 \times 10464}$$

$$S_3 = 3.77 \times 10^{-6}$$

AT #1C - String #2 Drawdown Test 2-28-75-3-10-75

Time, in hours since pump turned on.



1.98

$t_0 = 0.052 \text{ hrs}$

$$T_1 = \frac{2640}{25.2}$$

$$25.2 = 420 - 316 = 104 = 240.2'$$

$$= \frac{2640 \times 1.32}{240.2}$$

$$T_1 = 143 \text{ g/d/ft}$$

$$S_1 = \frac{T_1 t_0}{400 r^2} - r = 127'$$

$$= \frac{143 \times 0.052}{7.74 \times 10^7}$$

$$S_1 = 1.08 \times 10^{-4}$$

$$T_2 = \frac{2640}{25.2}$$

$$25.2 = 316 - 275 = 41 = 94.7'$$

$$= \frac{2640 \times 1.25}{94.7}$$

$$T_2 = 348 \text{ g/d/ft}$$

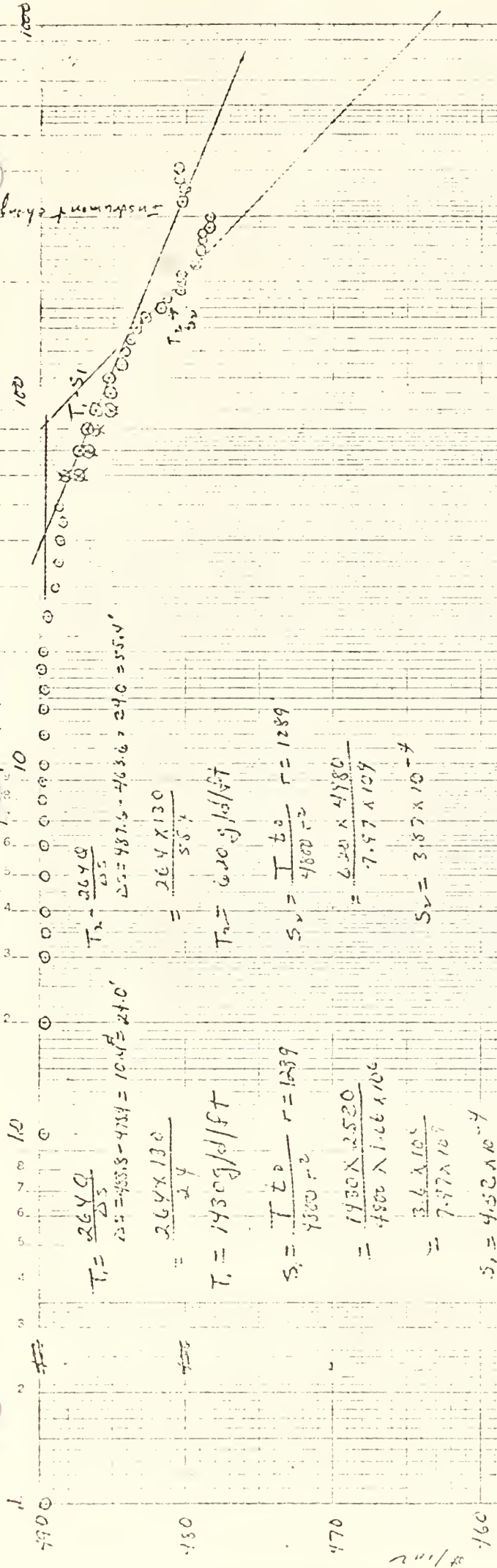
$$S_2 = \frac{T_2 t_0}{400 r^2}$$

$$= \frac{348 \times 1.92}{7.74 \times 10^7}$$

$$S_2 = 3.63 \times 10^{-6}$$

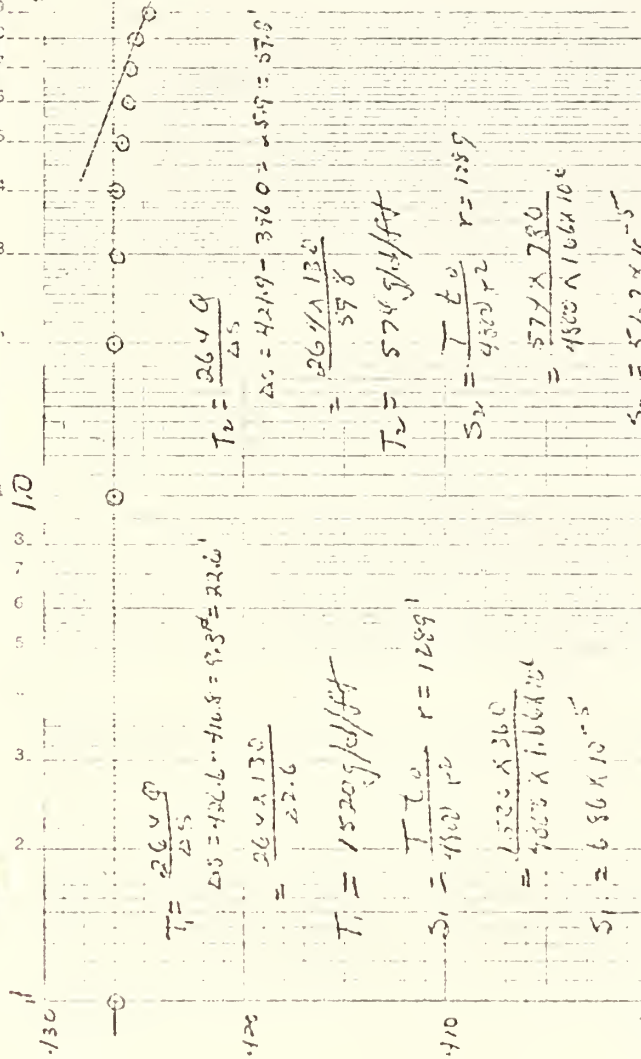
AT #1D - string #1 Drawdown Test 2-28-75-3-10-75

3. Друге поправки



56-#6-#testing Drawdown Test 2-22-75- 3-10-75

Time in hours since pumping began.



$$T_1 = \frac{26.4 Q}{\Delta S}$$

$$\Delta S = 130.6 - 10.8 = 119.8 = 119.8'$$

$$= \frac{26.4 \times 130}{119.8}$$

$$T_1 = 1520.9 \text{ gal/ft}$$

$$S_1 = \frac{T_1 t_0}{4.80 r^2} \quad r = 128.9'$$

$$= \frac{1520.9 \times 360}{4.80 \times 128.9^2}$$

$$S_1 = 6.86 \times 10^{-5}$$

$$T_2 = \frac{26.4 Q}{\Delta S}$$

$$\Delta S = 120.6 - 37.2 = 83.4 = 83.4'$$

$$= \frac{26.4 \times 130}{83.4}$$

$$T_2 = 305.9 \text{ gal/ft}$$

$$S_2 = \frac{T_2 t_0}{4.80 r^2}$$

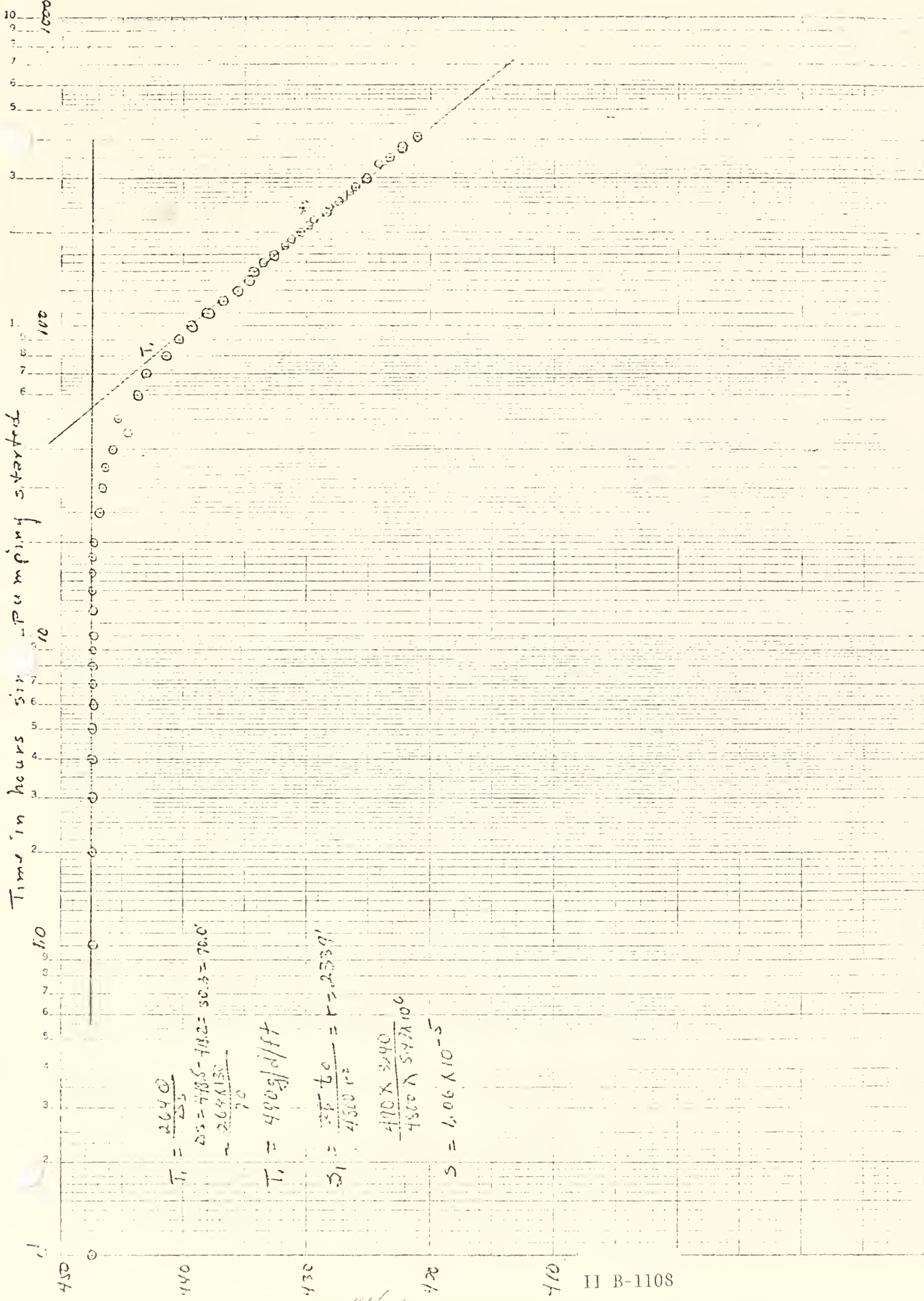
$$= \frac{305.9 \times 360}{4.80 \times 128.9^2}$$

$$S_2 = 5.31 \times 10^{-5}$$

$$S_3 = 6.66 \times 10^{-5}$$

56-6 #2 string Drawdown Test - 2-27-75 - 3-10-75

Time in hours since pumping started



$$T_1 = \frac{2640}{25}$$

$$25 = 418.5 - 418.2 = 30.3 = 70.0$$

$$T_1 = \frac{2640 \times 1.35}{70}$$

$$T_1 = 4909 \text{ ft}$$

$$S_1 = \frac{25 \times 70}{4500 \times 1.35} = 1.2539'$$

$$\frac{490 \times 240}{4500 \times 5.47 \times 10^6}$$

$$S = 1.06 \times 10^{-5}$$

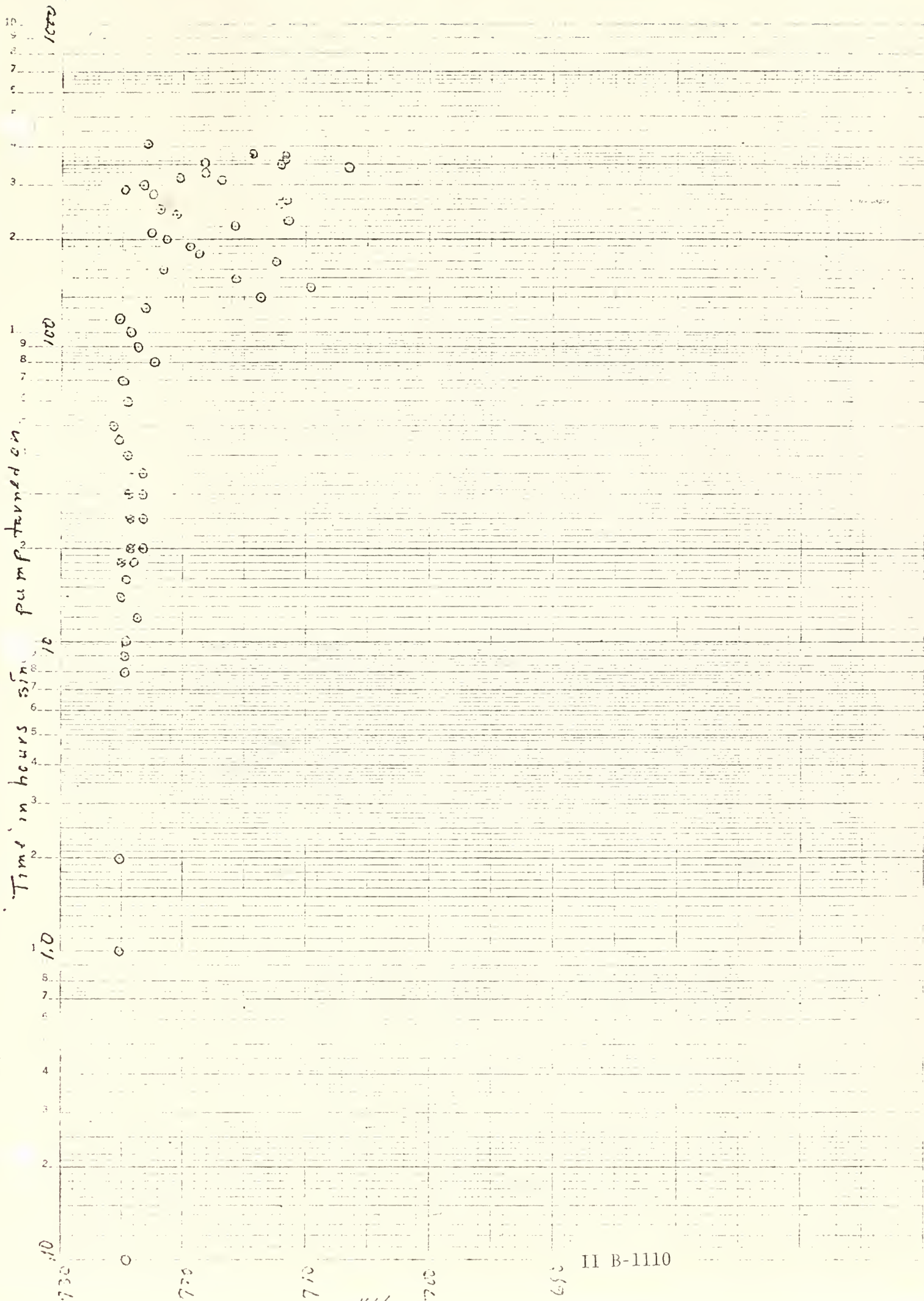
56-10 - #1 string. Drawdown Test 2-27-75 - 3-10-75

三

56-10 #2 Spring Drawdown Test 2-24-75 - 3-10-75

16, 6013

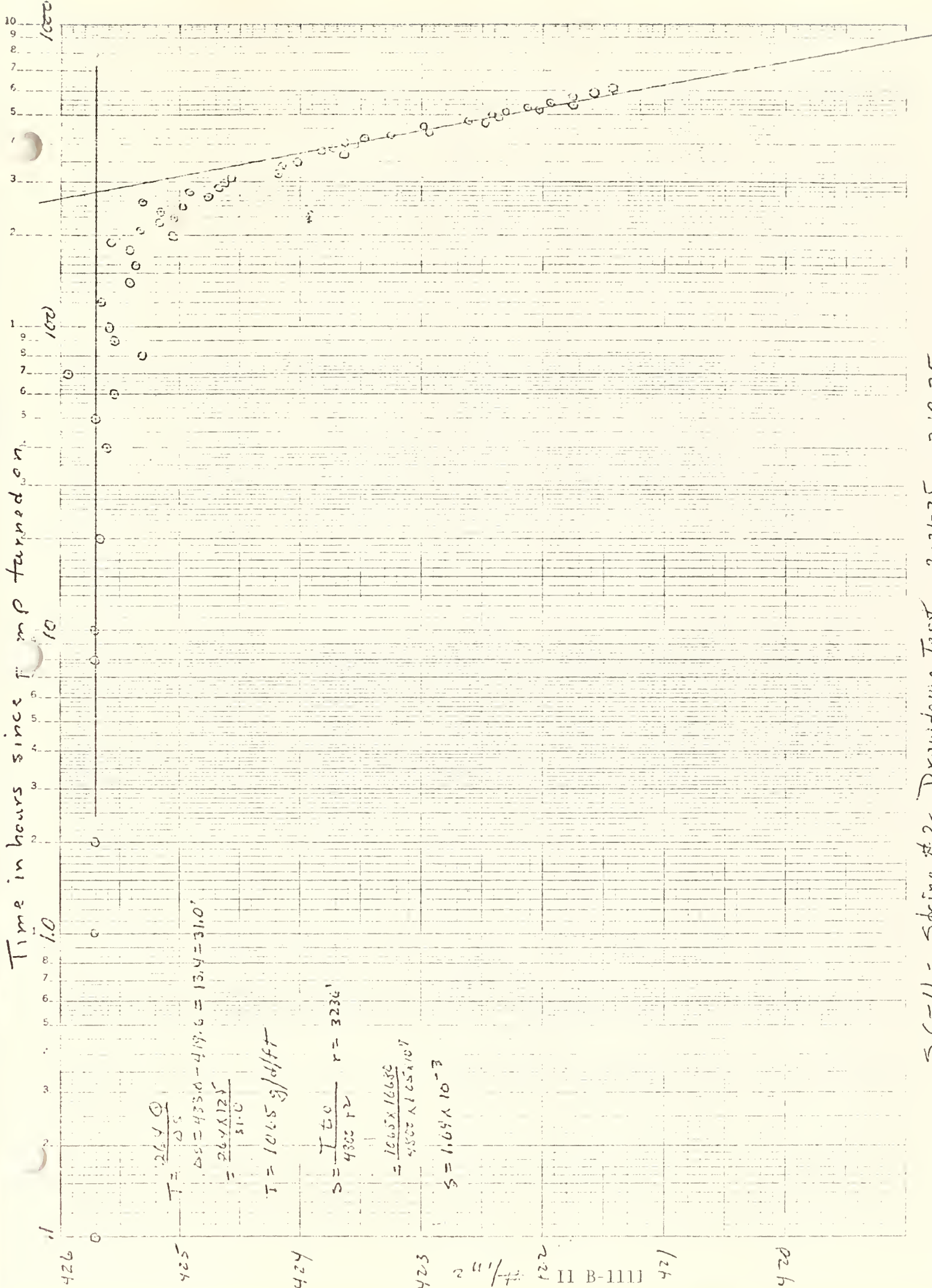
Time in hours since pump started on



11 B-1110

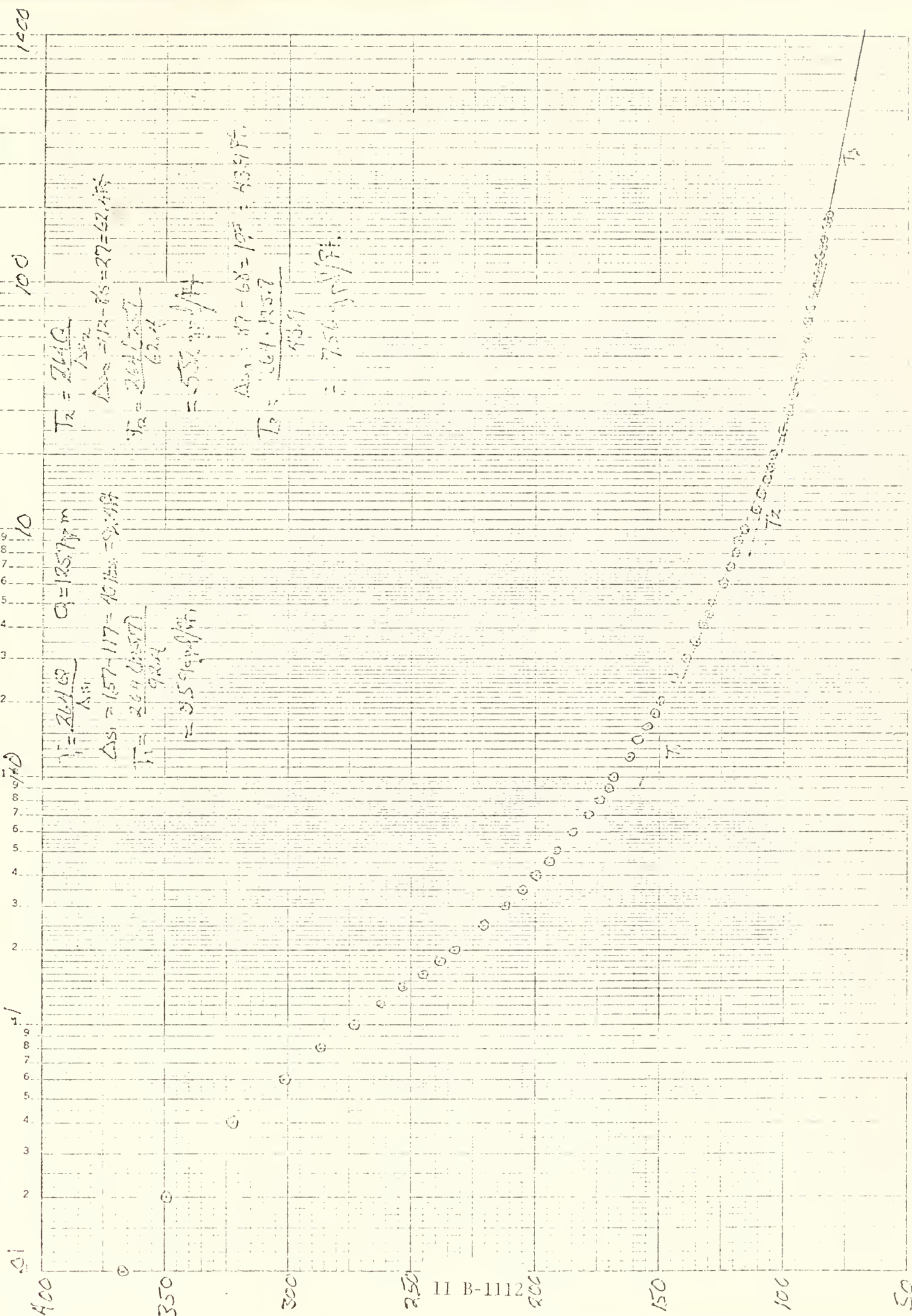
56-11 Siding #1 Drawdown Test 2-21-75 - 3-10-75

Time in hours since pump turned on



36-11 - Spring #2 Drawdown Test 2-21-75 - 3-10-75

Time in Hours since pump turned on



At #1 Pulse test Lower Aquifer - Drawdown

3-10-75

3-26-75

Time in hours since pump turned on

100
 200
 300
 400
 500
 600
 700
 800
 900
 1000

1.5
1.0
0.5
0.2
0.1

460

440

420

400

2 1/2

380

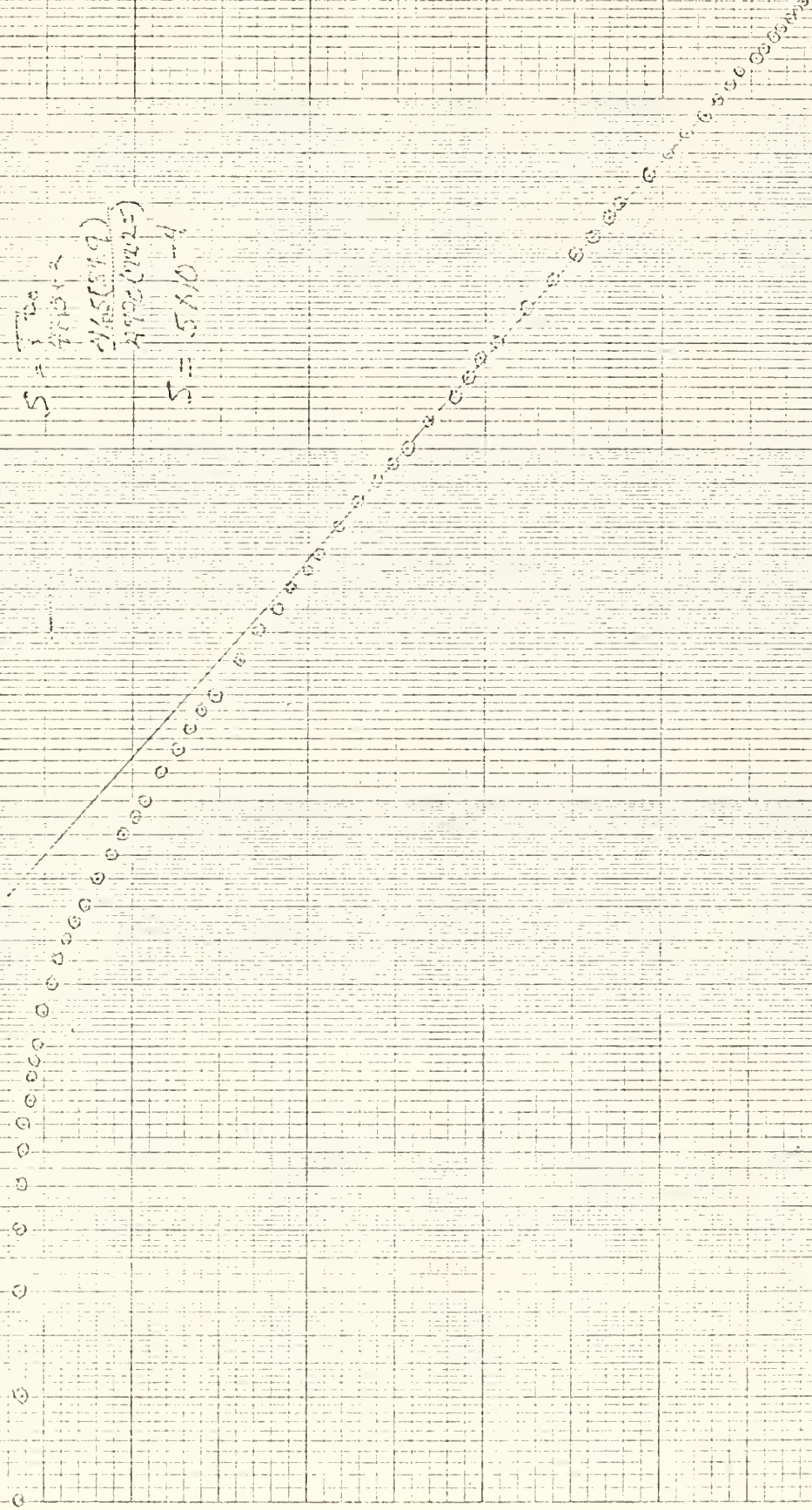
II B-1113

360

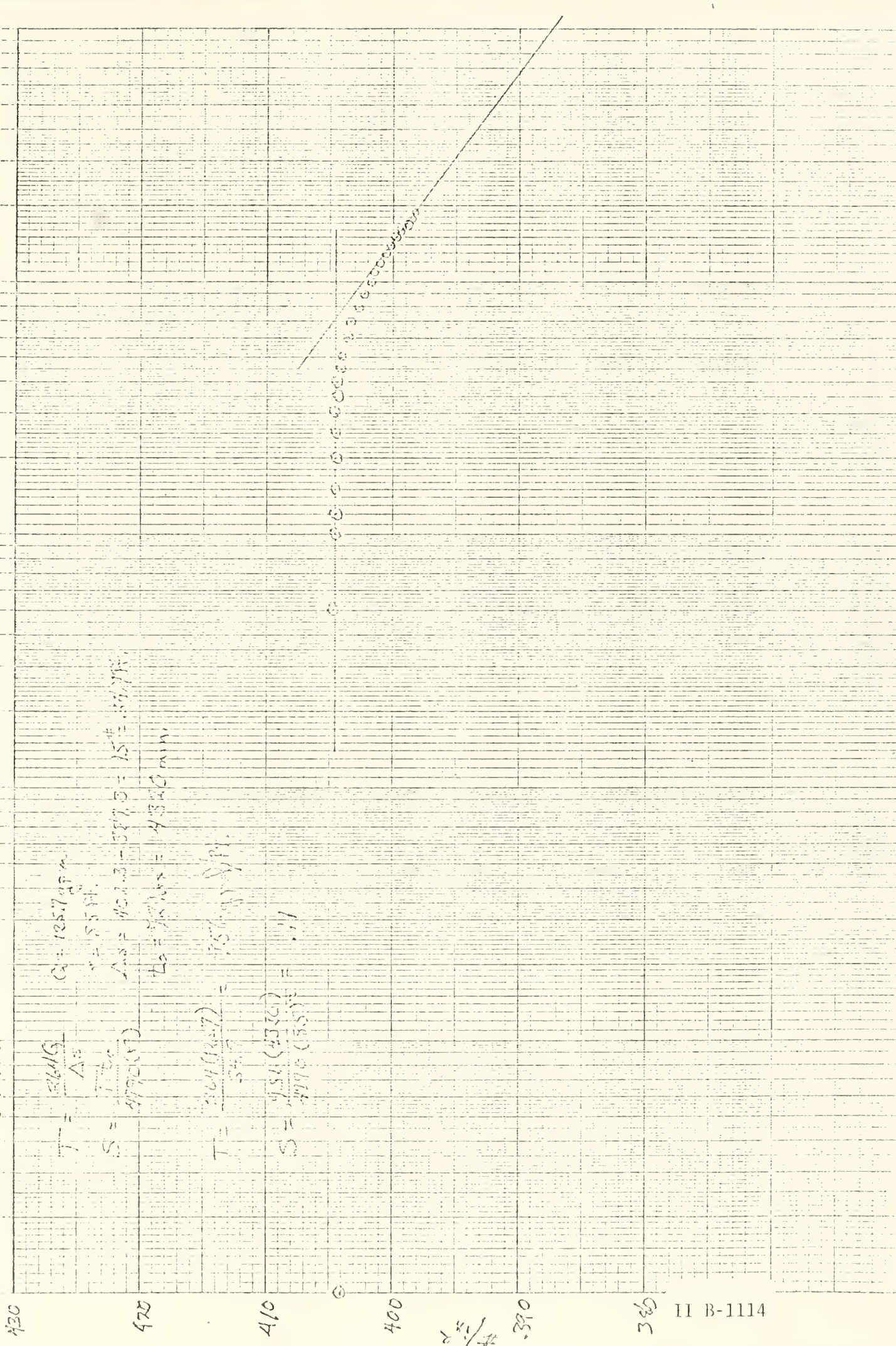
340

320

$T = 26.46$
 $Q = 12.57 \text{ gpm}$
 $LS = 221$
 $354 = 2576.2 = 80.9$
 $LS = 221$
 $354 = 2576.2 = 80.9$
 $T = 26.46 (12.57)$
 $EC = 1$
 $= 16.38 \text{ gal/ft}$
 $S = 1.00$
 410.0
 $415 (519)$
 $492 (1225)$
 $S = 5.10^{-4}$



1
9

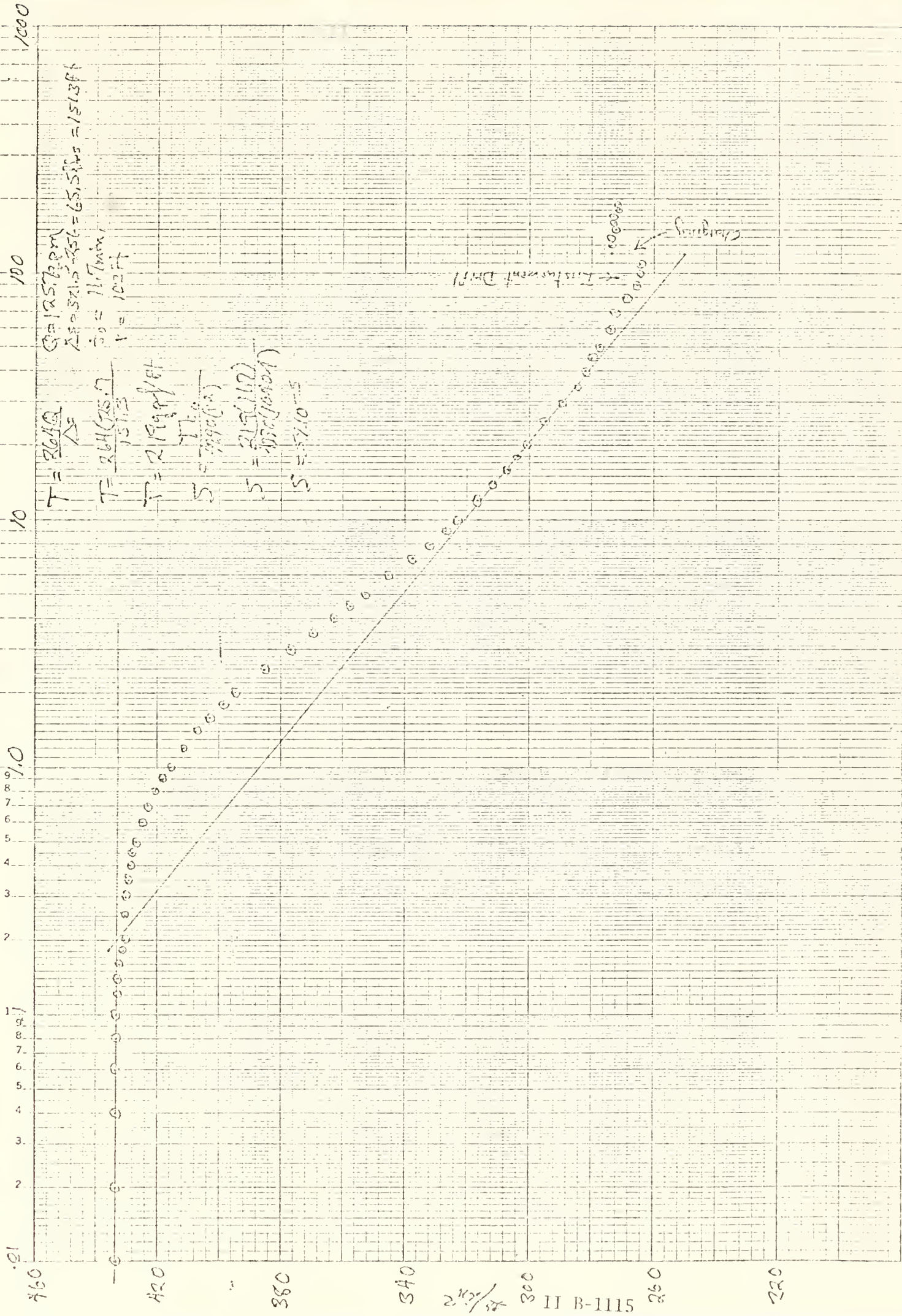


$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

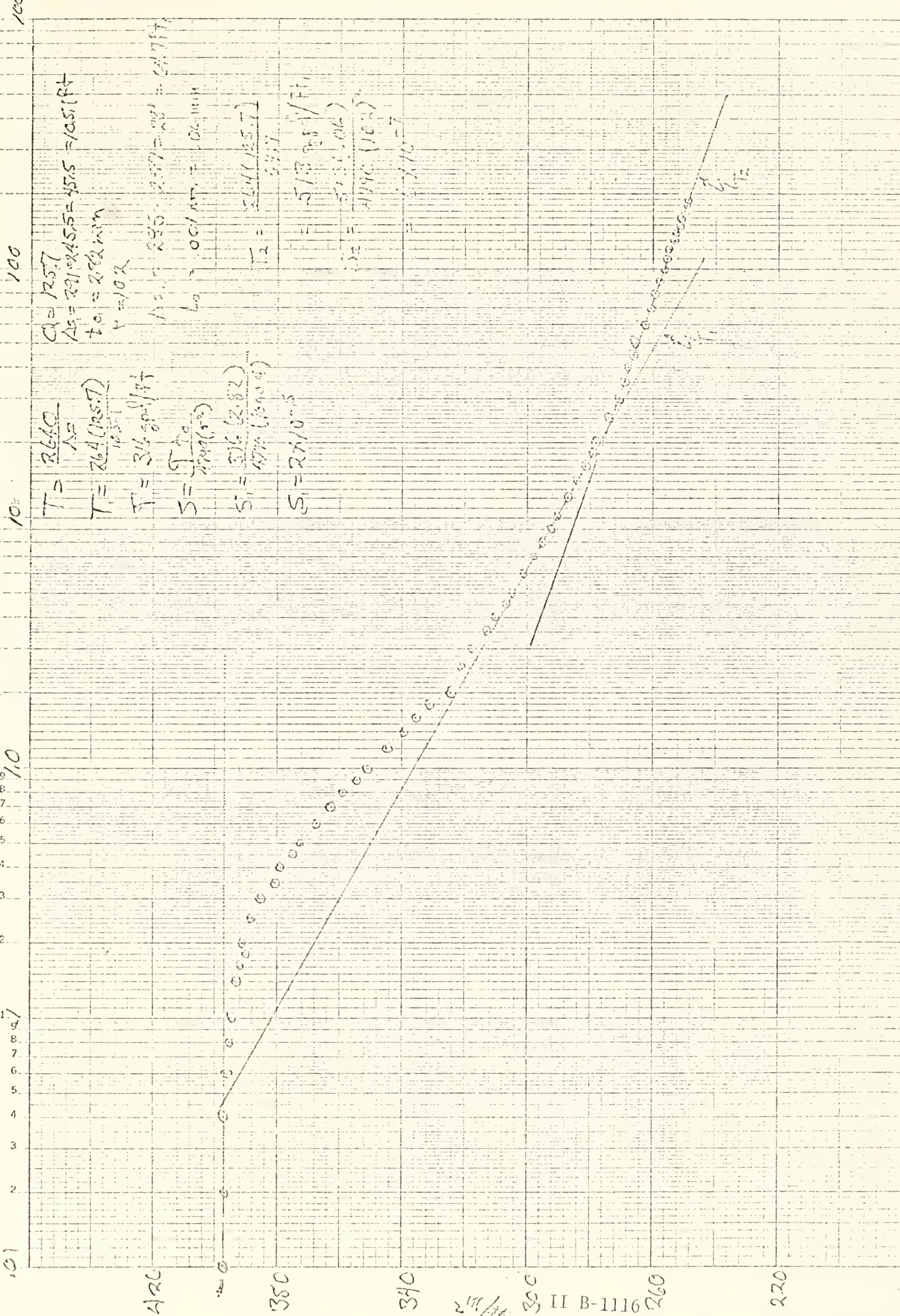
Lowell Aggie - Drawdown 3-18-25

3-26-75

Time in hours since pump turned on

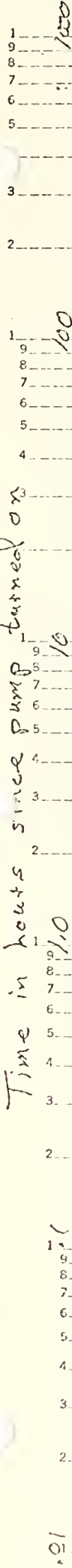


Time in hours since pump turned on



APIC String #2 Pulse Test Lower Aquifer - Drawdown 318-75 → 3-26-75

Time in hours since pump turned on



$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$\Delta S = 291.5 - 247 = 44.5 \text{ ft}$$

$$T = 2640 / 44.5 = 59.3 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

$$T = \frac{2640}{\Delta S}$$

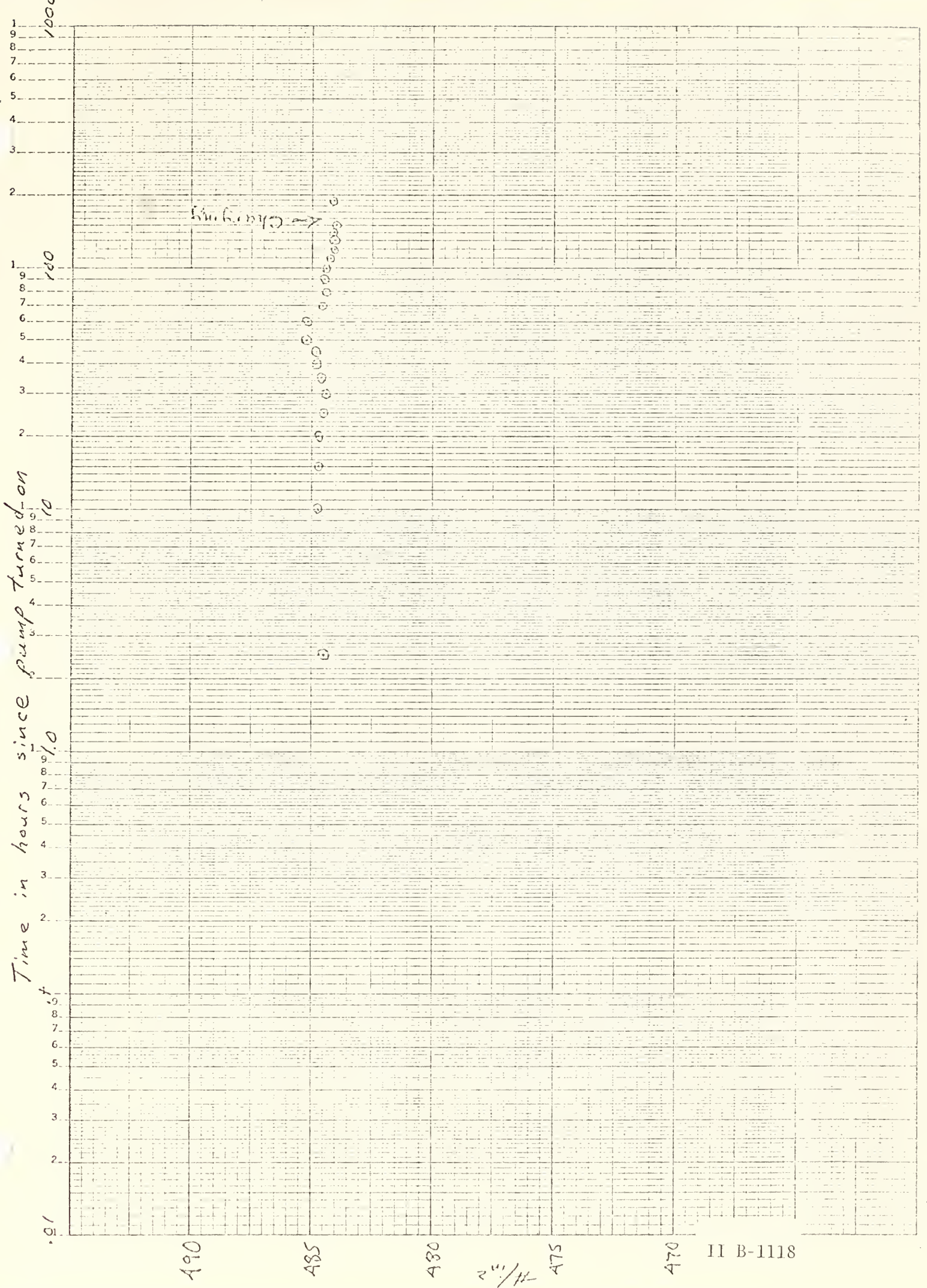
$$S = 125.7 \text{ ft}$$

$$\Delta S = 500 - 247 = 253 \text{ ft}$$

$$T = 2640 / 253 = 10.4 \text{ hr}$$

Charged

Time in hours since pump turned on



Pulse Test Lower Aquifer SG-6 #1 String Drawdown Test 3-18-75 3-26-75

Time in hours since pump turned on

430

$$T = \frac{2649}{\Delta s}$$

$$S = \frac{T^2}{4900 (F)}$$

$$G = 1257$$

$$F = 12.89$$

$$\Delta s = 12.7 - 30.2 = 30.5^{\text{ft}} = 75.17$$

$$L_s = 12.7 / 1000 = 12.62 \text{ m.m.}$$

$$T = \frac{264.1257}{75.17} = 442.29 \text{ m.m.}$$

$$S = \frac{442.136}{4900 (12.89)} = 8.810^{-5}$$

410

400

2 $\frac{m}{\#}$

390

II B-1119

380

370



Time in hours since pump turned on

10 100 1000

$$T = 2339 \text{ ft.}$$

$$Q = 125.7 \text{ gpm}$$

$$T = \frac{2641 Q}{1.25}$$

$$\Delta S_1 = 131.6 - 421.8 = 9.8 \text{ ft.} = 22.6 \text{ ft.}$$

$$t_0 = 46 \text{ hrs} = 2.760 \text{ min.}$$

$$\Delta S_2 = 444.7 - 427 = 17.7 \text{ ft.} = 110.9 \text{ ft.}$$

$$L_{0.2} = 70 \text{ min} = 1100 \text{ min.}$$

$$S = \frac{T t_0}{4790 r^2}$$

$$T_1 = \frac{2641 \cdot 125.7}{22.6} = 1463 \text{ gpd/ft.}$$

$$S_1 = \frac{146.8 \cdot 2760}{4790 (2.55)^2} = 1.5 \times 10^{-4}$$

$$T_2 = \frac{2641 \cdot 125.7}{110.9} = 301 \text{ gpd/ft.}$$

$$S_2 = \frac{146.8 \cdot 2760}{4790 (2.55)^2} = 1.3 \times 10^{-4}$$

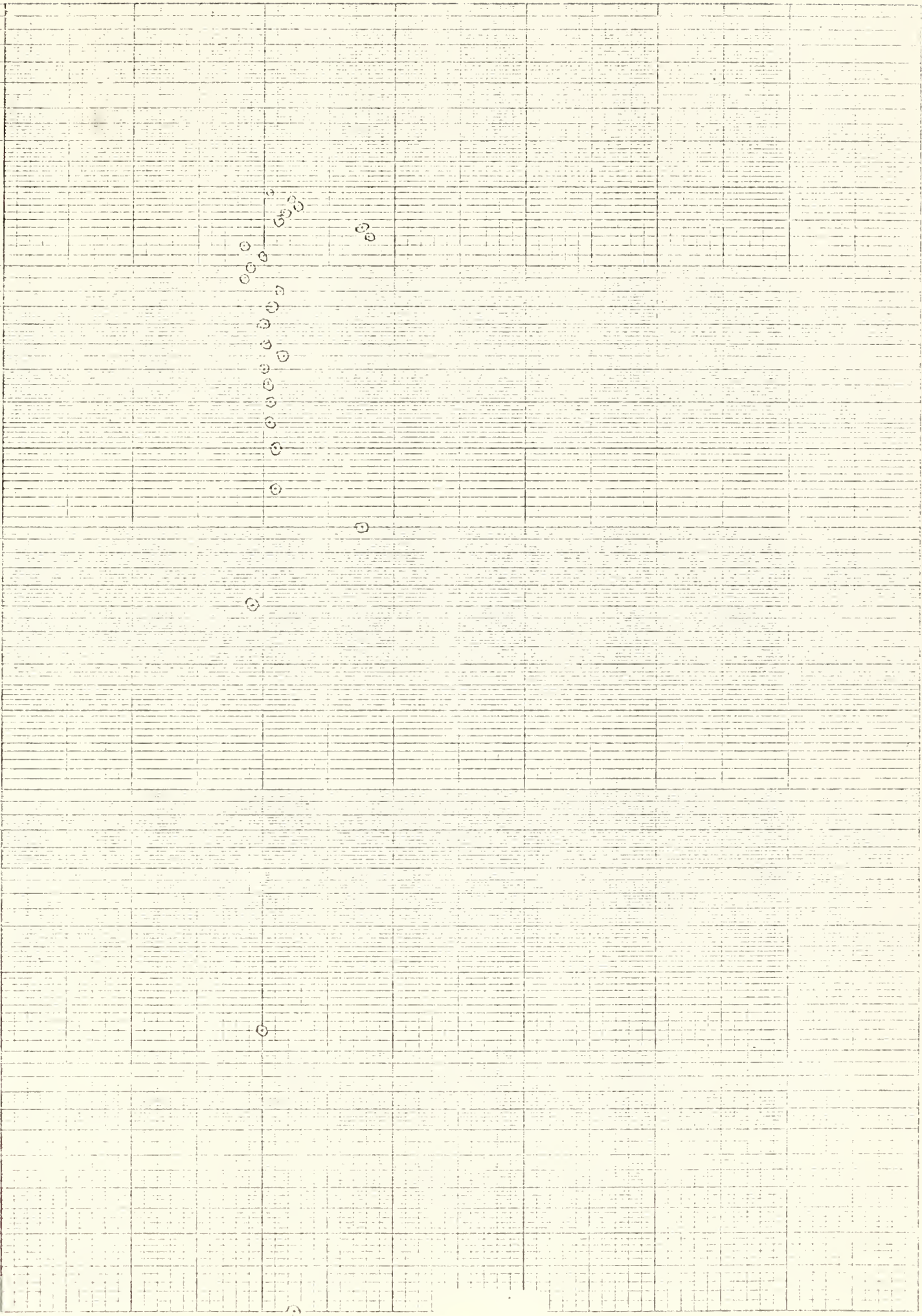
#/in²



Pulse Test SG-10 String #1 Drawdown Test 3-18-75 — Lower Aquifer 3-26-75

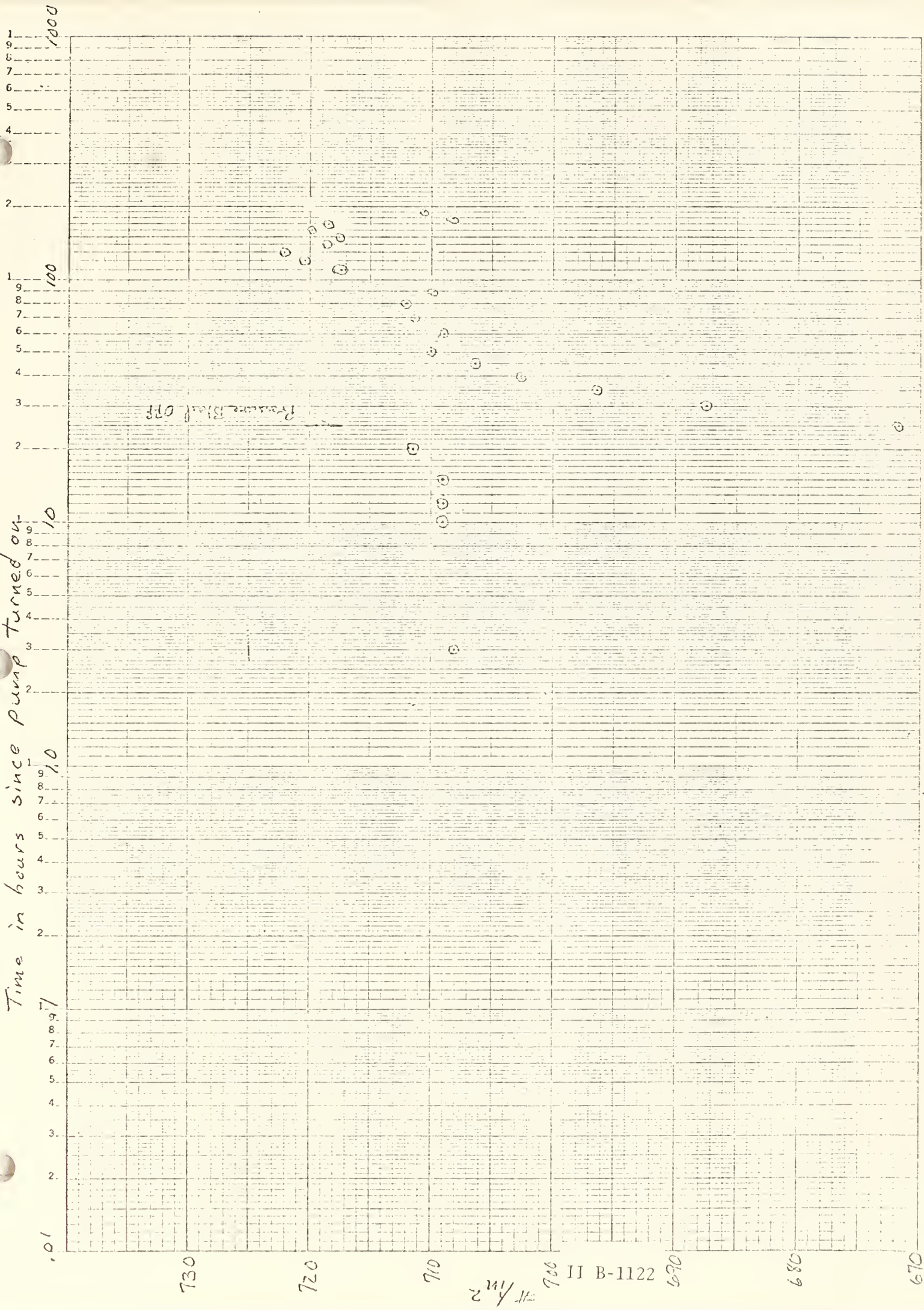
Time in hours since pump turned on

1000
100
10
1.0
0.1

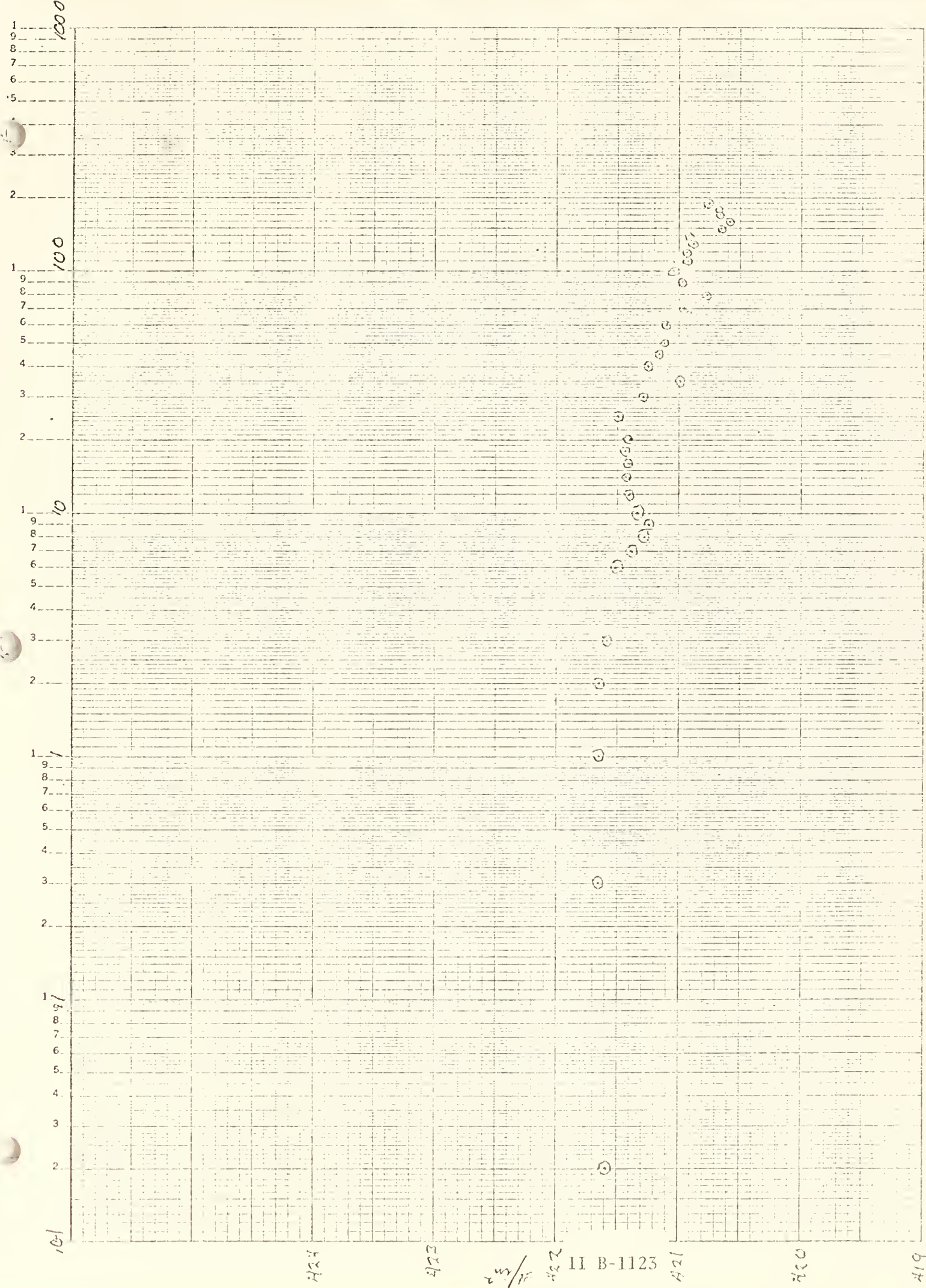


Pulse Test 56-10 string #2 Drawdown 3-18-75 Lower Aquifer 3-26-75

Time in hours since pump turned out



Pulse Test Lower Agiler SG-11 String #1 Drawdown Test 3-18-75 3-26-75



Pulse Test Lower Aquifer SG-11 #2 String & Drawdown test 3-18-75 → 3-26-75

LOWER AQUIFER PUMP TEST

FINAL RECOVERY CURVES

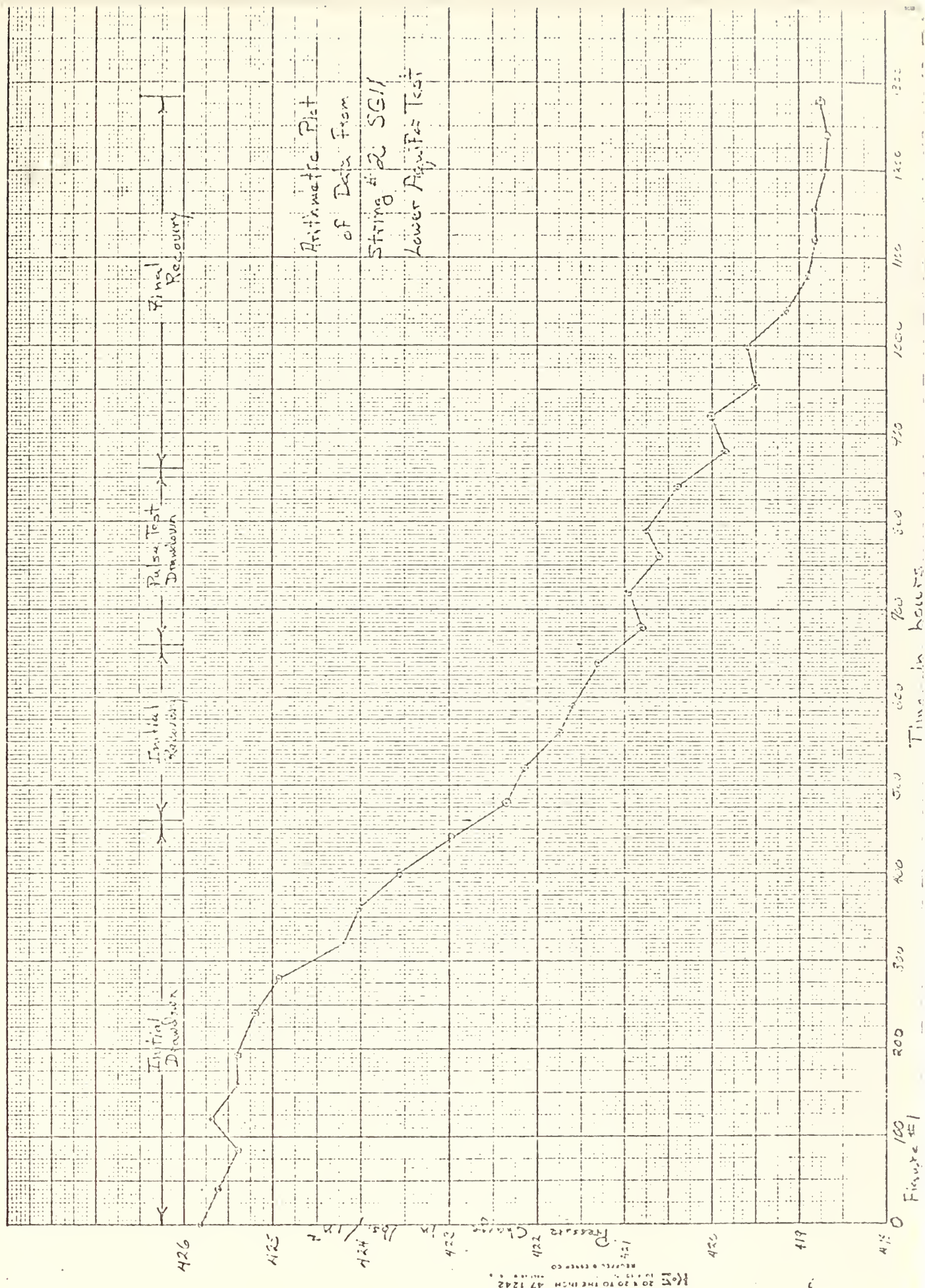
TABLE II B-54
TRANSMISSIVITY and STORAGE COEFFICIENT VALUES

Lower Aquifer Pump Test

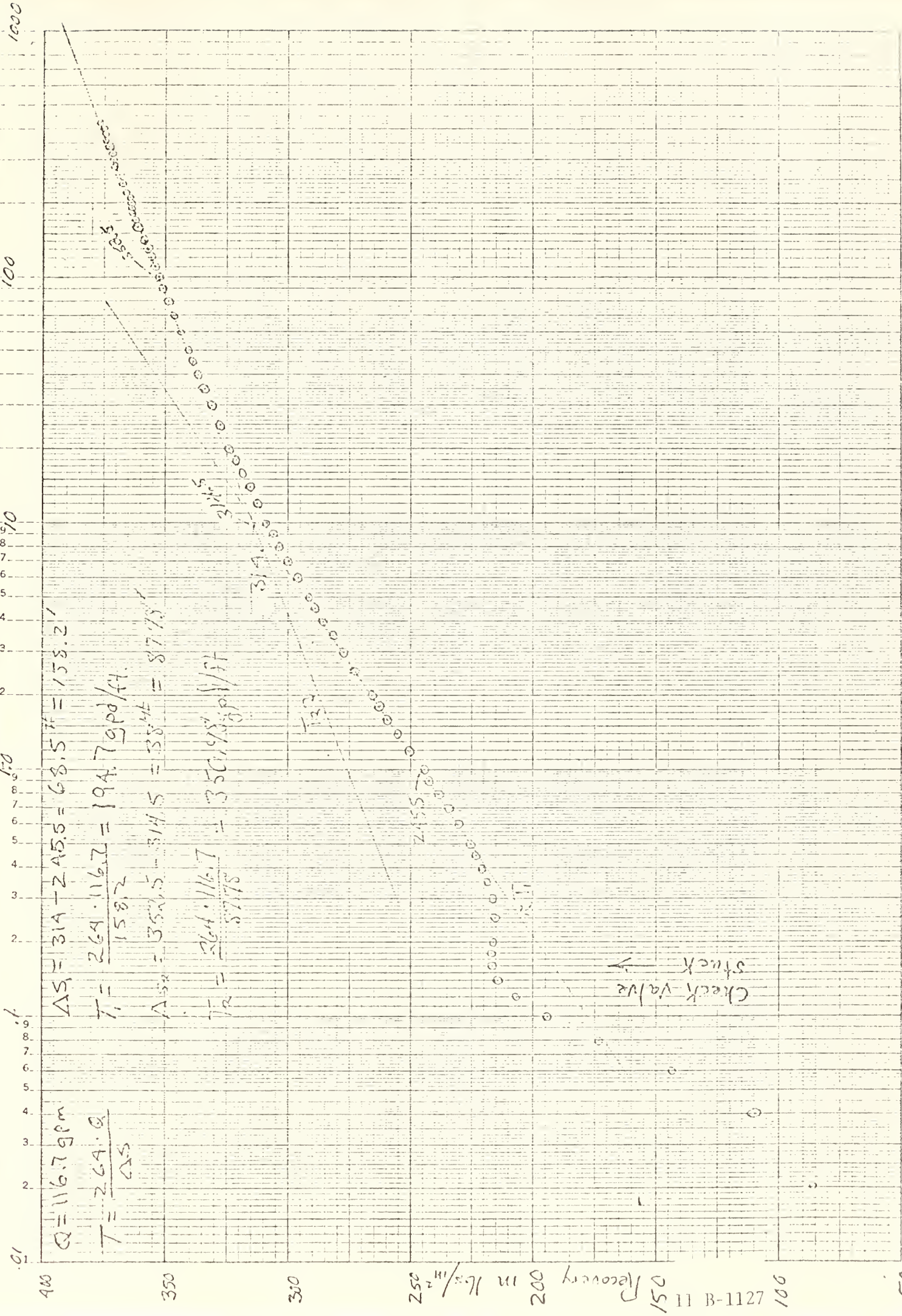
Well No.	Final Recovery
AT#1	T = 194.7 gpd/ft. Initial T = 351.0 gpd/ft. Final
AT#1A (String #1)	T = 333.4 gpd/ft.; S = 6.4×10^{-4} Initial T = 365.4 gpd/ft.; S = 5.3×10^{-4} Final
(String #2)	NO VALID RESPONSE
AT#1C (String #1)	T = 133.4 gpd/ft.; S = 1.8×10^{-4} Initial T = 310.3 gpd/ft.; S = 1.5×10^{-5} Final
(String #2)	T = 226 gpd/ft.; S = 5.2×10^{-5} Initial T = 346.9 gpd/ft.; S = 1.4×10^{-5} Final
AT#1D (String #1)	T = 303.2 gpd/ft.; S = 2.5×10^{-5} Initial T = 360.5 gpd/ft.; S = 1.1×10^{-5} Final
SG-6 (String #1)	T = 380.8 gpd/ft.; S = 1.02×10^{-3}
(String #2)	T = 400.5 gpd/ft.; S = 8×10^{-5}
SG-10 (String #1)	T = 694.6 gpd/ft.; S = 1.4×10^{-5}
(String #2)	NO RESPONSE
SG-11 (String #1)	NO USABLE RESPONSE DUE TO HIGH GAS PRESSURE POSSIBLE
(String #2)	NO USABLE RESPONSE DUE TO <u>TO</u> /INSTRUMENT DRIFT

THE UNIVERSITY OF CHICAGO DEPARTMENT OF CHEMISTRY RECORD OF RESEARCH

NAME OF RESEARCHER	DATE
J. H. VAN VLECK	1928
J. H. VAN VLECK	1929
J. H. VAN VLECK	1930
J. H. VAN VLECK	1931
J. H. VAN VLECK	1932
J. H. VAN VLECK	1933
J. H. VAN VLECK	1934
J. H. VAN VLECK	1935
J. H. VAN VLECK	1936
J. H. VAN VLECK	1937
J. H. VAN VLECK	1938
J. H. VAN VLECK	1939
J. H. VAN VLECK	1940
J. H. VAN VLECK	1941
J. H. VAN VLECK	1942
J. H. VAN VLECK	1943
J. H. VAN VLECK	1944
J. H. VAN VLECK	1945
J. H. VAN VLECK	1946
J. H. VAN VLECK	1947
J. H. VAN VLECK	1948



Time in hours since pump turned off



Time in hours since pump turned off.

0.1

460

$$r = 85 \text{ ft.}$$

$$Q = 116.7 \text{ gpm}$$

$$T = \frac{264 Q}{AS}$$

$$S = \frac{T - t_0}{A190 r^2}$$

$$\Delta S_1 = 382 - 342 = 40' = 92.4'$$

$$t_0 = 66 \text{ min.}$$

$$T_1 = \frac{264 \cdot 116.7}{92.4} = 333.4 \text{ gpd/ft.}$$

$$S_1 = \frac{333.4 \cdot 66}{4790 \cdot (85)^2} = 6.4 \times 10^{-4}$$

$$AS_1 = 419.5 \cdot 10^{-4} = 36.5' = 84.3 \text{ ft.} \quad Z_{S_1} = 51 \text{ min}$$

$$T_2 = \frac{264 \cdot 116.7}{84.3} = 365.7 \text{ gpd/ft.}$$

$$S_2 = \frac{365.7 \cdot 51}{4790 \cdot (85)^2} = 5.5 \times 10^{-4}$$

420

400

380

360

340

320

300

280

260

240

220

200

180

160

140

120

100

80

60

40

20

0

100

100

100

100

100

100

100

100

100

100

At 10 #/40... 1... 4-15-7.

TIME IN HOURS SINCE PUMP TURNED OFF

0.1

1

2

3

4

5

6

7

8

9

10

100

1000

10000

100000

1000000

430

$C_p = 116.7 \text{ ppm}$

$F = 85 \text{ FT}$

$\Delta S = 31.5 \text{ ft} = 119.7 \text{ ft}$

$L_0 = 6720 \text{ ft}$

$$T = \frac{2646}{\Delta S}$$

$$S = \frac{1}{L_0}$$

$$L_0 = 4790(5)$$

$$T = \frac{2641.16.7}{47.7} = 6199.8 \text{ ft}?$$

$$S = \frac{619.9.6720}{4790(8.5)} = 1.2?$$

4 - 1000000 ft

400

390

380

370

360

350

340

330

320

310

300

290

280

270

260

250

240

230

220

210

200

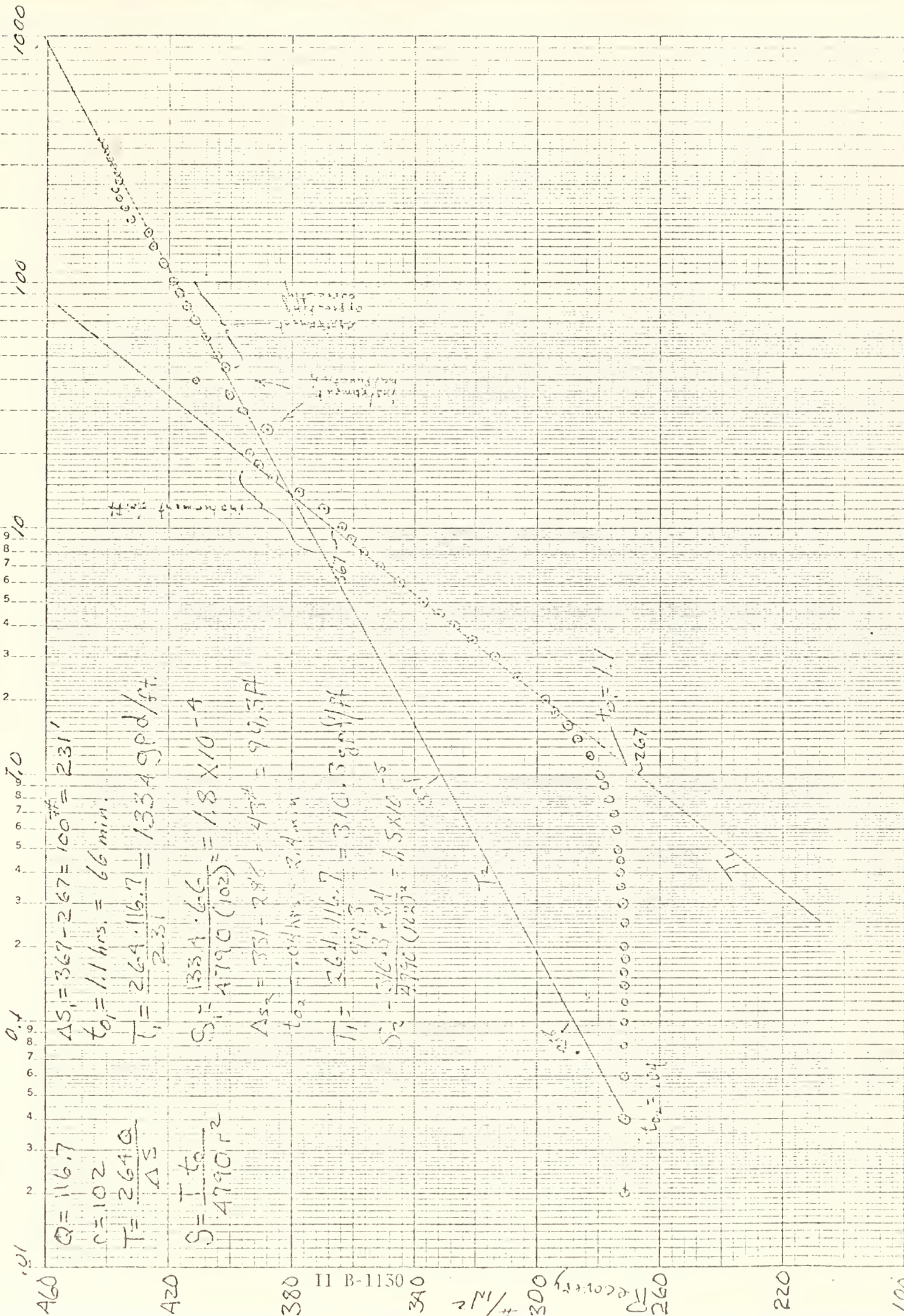
AT IN #10.11

END OF RECORD

2-21-75 TO 2-15-75

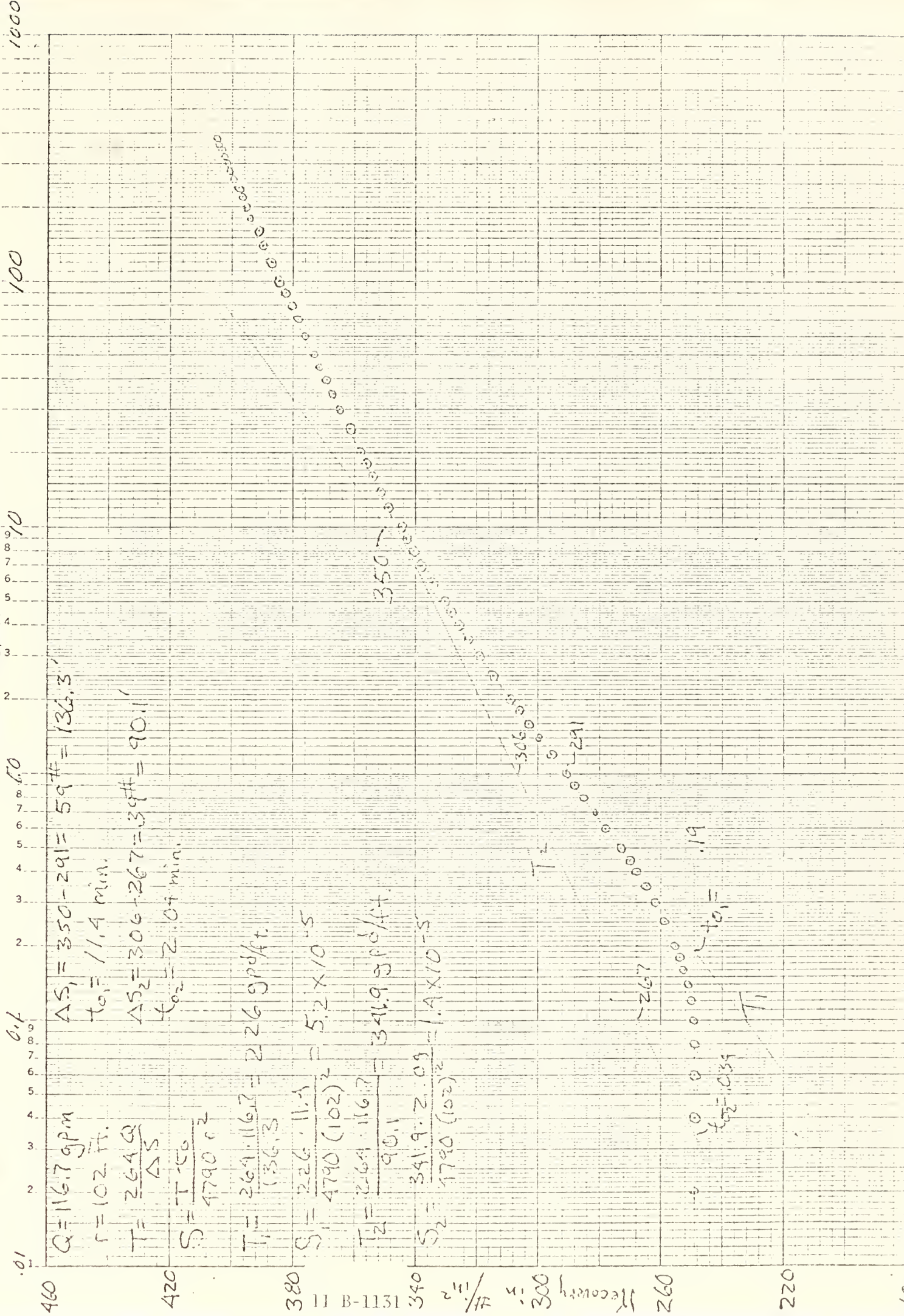
2-15-75

TIME IN HOURS SINCE PUMP TURNED OFF



AT - 10 #1 STRINK FUNDI RECOVERED LOWER AQUIFER 3-24-75 TO 4-15-75

TIME IN HOURS SINCE PUMP TURNED OFF³



At-10 ~~STINK~~ #7 FIND1 RECOVERY LOWER AQUIFER 3-26-75 TO 4-15-75

TIME IN HOURS SINCE PUMP TURNED OFF

495

0.1

1.0

10

100

1000

$$T = \frac{264.6}{1.15}$$

$$T = \frac{264.116.7}{8.64} = 3808 \text{ gal/ft}$$

$$S = \frac{T t_0}{4790 (S)^2}$$

$$S = \frac{3808 \cdot 2130}{4790 (1200)^2}$$

$$C_1 = 116.7 \text{ gpm}$$

$$T = 1254 \text{ ft}$$

$$A_0 = 3.5 = 807 \text{ ft}$$

$$t_0 = 35.5 \text{ hrs} = 2130 \text{ min}$$

485

B-1133

480

Recovery #1

475

470

465

460

SC #1

STRING #1

EMPIRICAL

1.1160

2.2175

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

1.1575

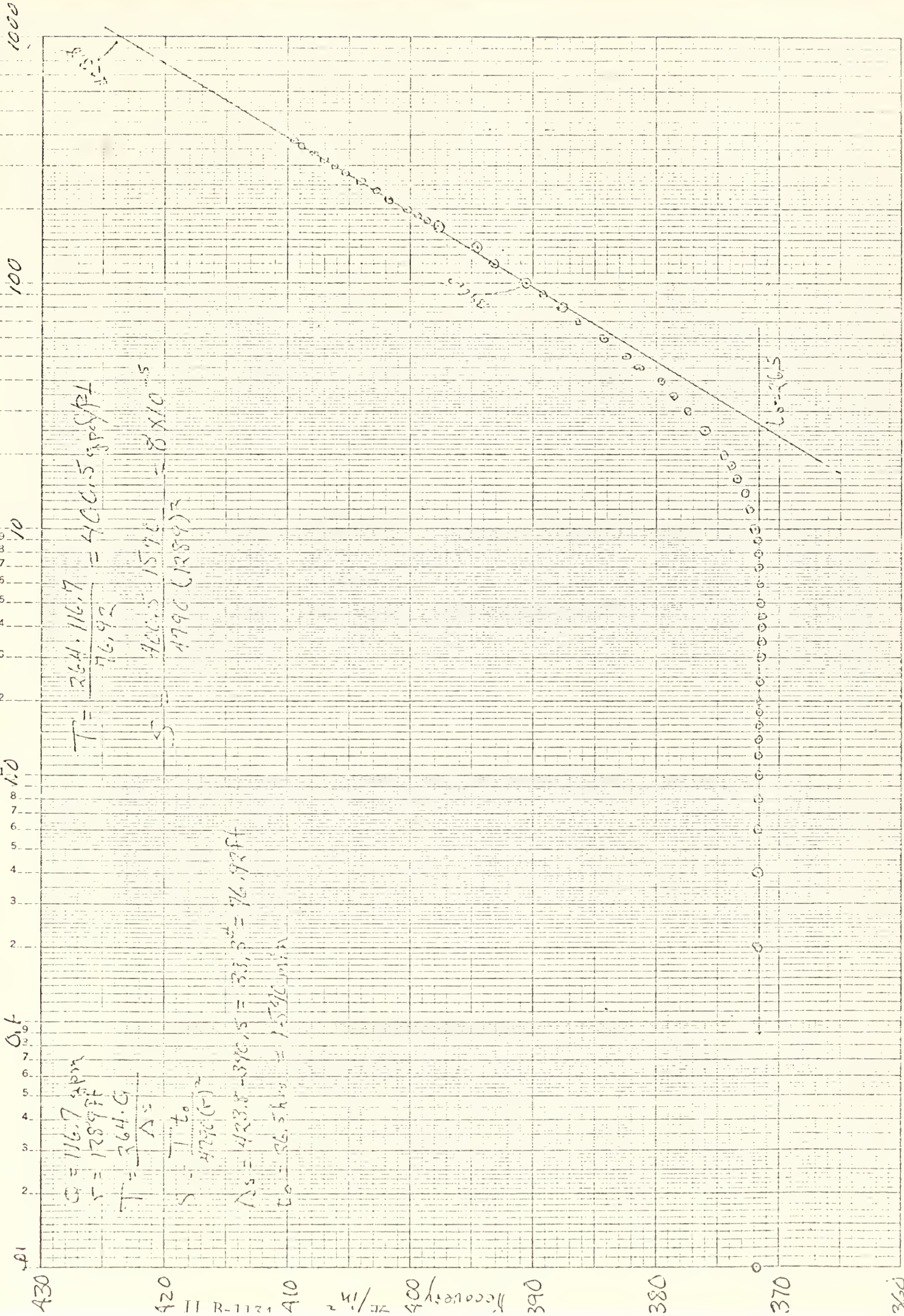
1.1575

1.1575

1.1575

1.1575

TIME IN HOURS SINCE PUMP TURNED OFF



$$Q = 116.7 \text{ gpm}$$

$$r = 1289 \text{ ft}$$

$$T = \frac{264.6}{\Delta s}$$

$$S = \frac{T \cdot t_0}{4790(r')^2}$$

$$\Delta s = 423.8 - 340.5 = 83.3 \text{ psi} = 76.12 \text{ ft}$$

$$t_0 = 26.5 \text{ hrs} = 1530 \text{ min}$$

$$T = \frac{264.6 \cdot 116.7}{76.12} = 406.5 \text{ gpm/ft}$$

$$S = \frac{406.5 \cdot 1530}{4790 (1289)^2} = 8 \times 10^{-5}$$

375

SC# 1 STINK #7 FINAL RECOVERY 1 SINCE ADVISED 3-1-72 1 15-72

TIME IN HOURS SINCE PUMP TURNED OFF

0.1 1 2 3 4 5 6 7 8 9 10

100 1000

$$T = \frac{364.16}{1.26} = 289.02$$

$$S = \frac{1.26}{4790(5)^2} = 1.4 \times 10^{-5}$$

$$C_0 = 116.7 \text{ gpm}$$

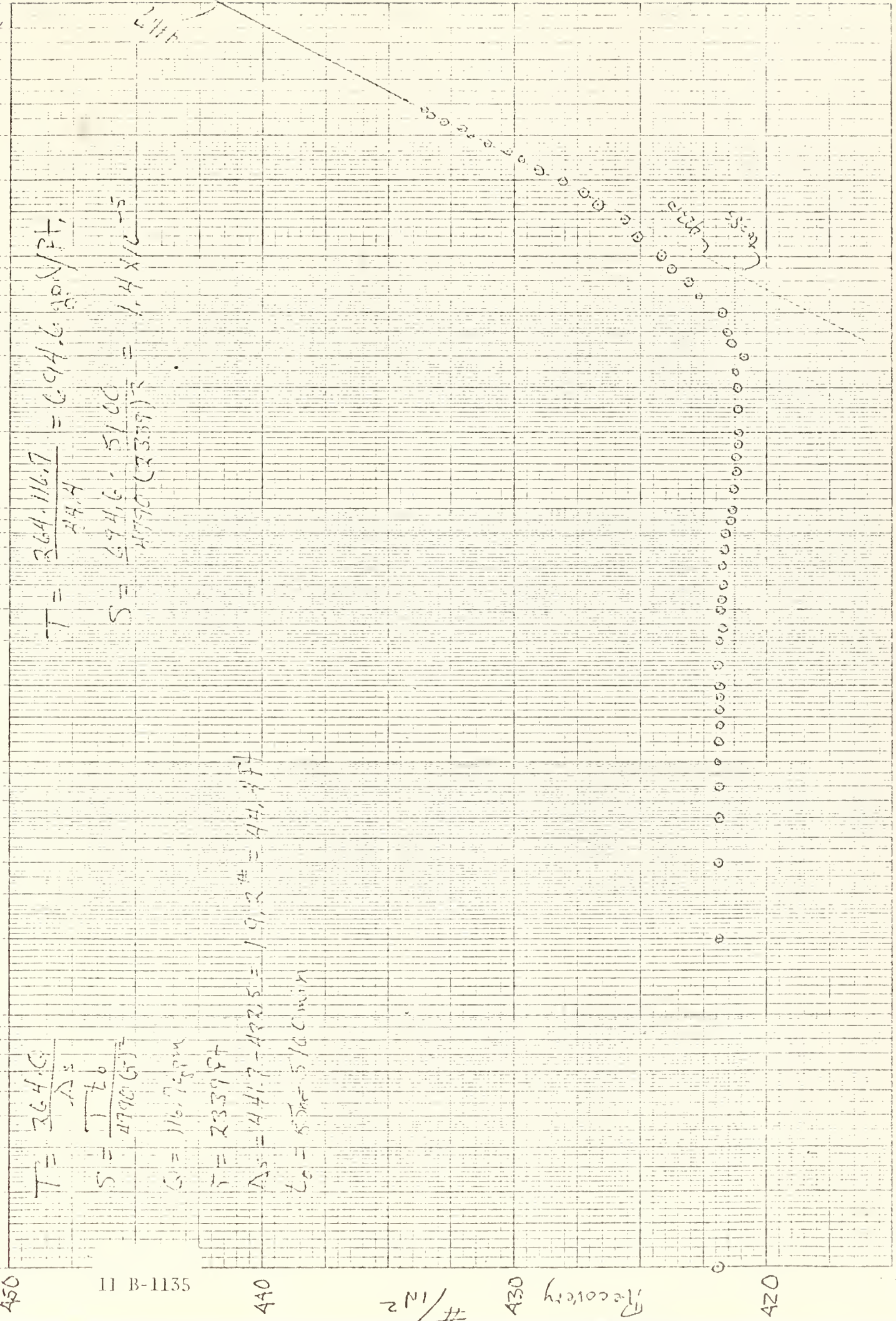
$$T = 2339 \text{ ft}$$

$$N_s = 441.7 - 422.5 = 19.2 \text{ ft} = 44.4 \text{ ft}$$

$$L_0 = 85 \text{ ft} = 5100 \text{ min}$$

$$T = \frac{364.116.7}{1.26} = 289.02$$

$$S = \frac{1.26}{4790(5)^2} = 1.4 \times 10^{-5}$$



AG#10 STOPPING #1 FINAL RECOVERY LOWER AQUIFER 3-26-75 TO 4-15-75

46 6212

46 6212

TIME IN HOURS SINCE PUMP TURNED OFF

650

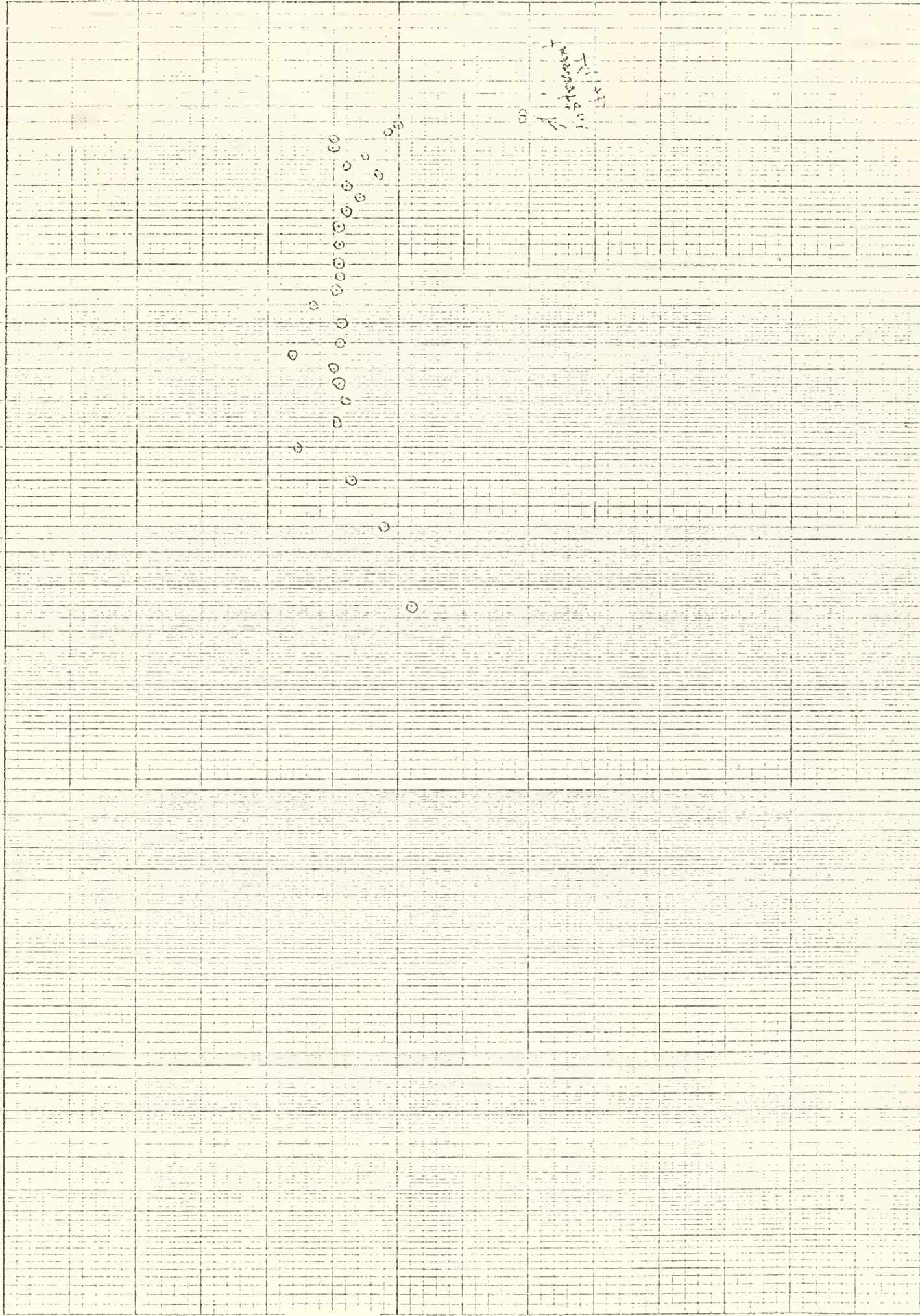
0.1

2 3 4 5 6 7 8 9

10

100

1000



643

644

645

646

647

648

649

650

651

652

653

654

655

656

657

658

659

660

661

TIME IN HOURS SINCE PUMP TURNED OFF

0.1

2

3

4

5

6

7

8

9

10

20

30

40

50

60

70

80

90

100

200

300

400

500

600

700

800

900

1000

740

730

B-1137

720

710

#/in²

700

Recovery

690

680

670

High pressure
Block of P
Instrument malfunction

CD # 11 <TD IN C # 1

FINAL

DECEMBER

1950

7-21-75

TA

4-15-77

TIME IN HOURS SINCE PUMP TURNED OFF

0.1

1

2

3

4

5

6

7

8

9

10

100

10

1

2

3

4

5

6

7

8

9

10

100

10

426

425

424

II B-1138

423

422

421

420

419

Instrument drift

SC-#11 STRING#2

FINAL RECOVERU

10000

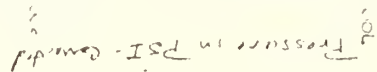
ACQUIRED

2-20-75

TO 4-15-75

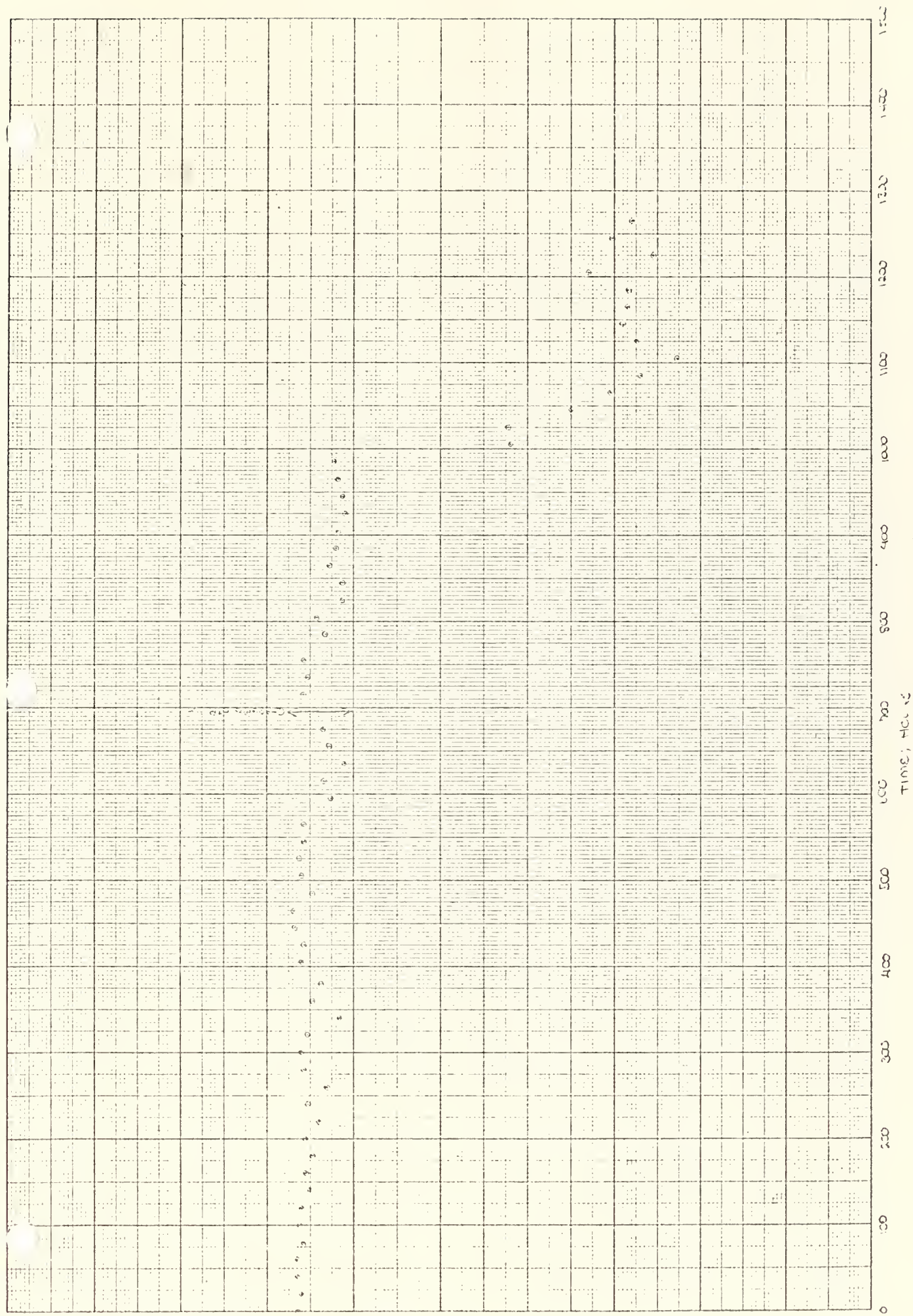
LOWER AQUIFER PUMP TEST
CORRECTED PRESSURE CURVES

99



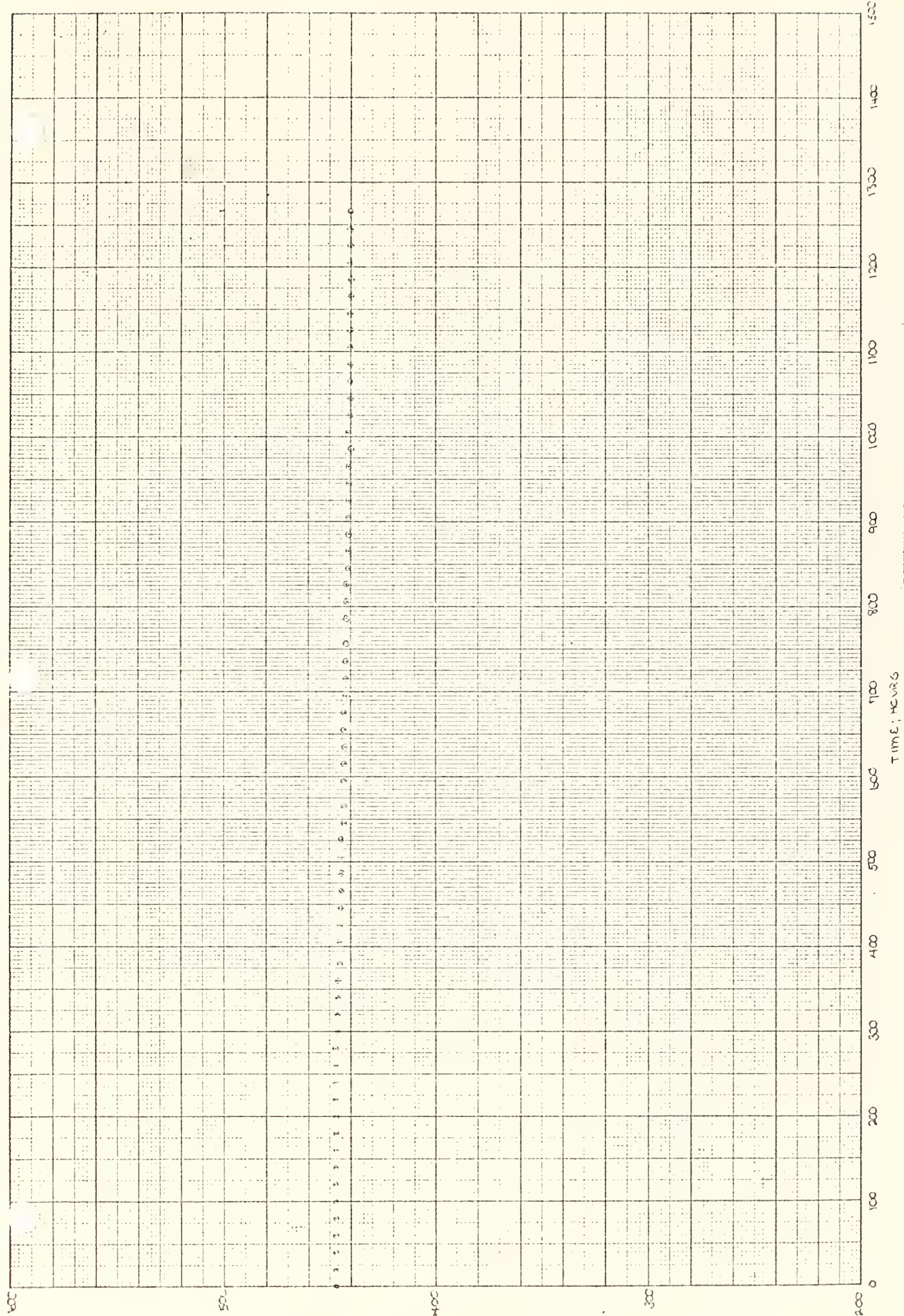
20 X 20 TO THE INCH 47 1242

11 B-1140



2.

LOWER AQUICL PUMP TEST : 26-11 STARTED AT 2

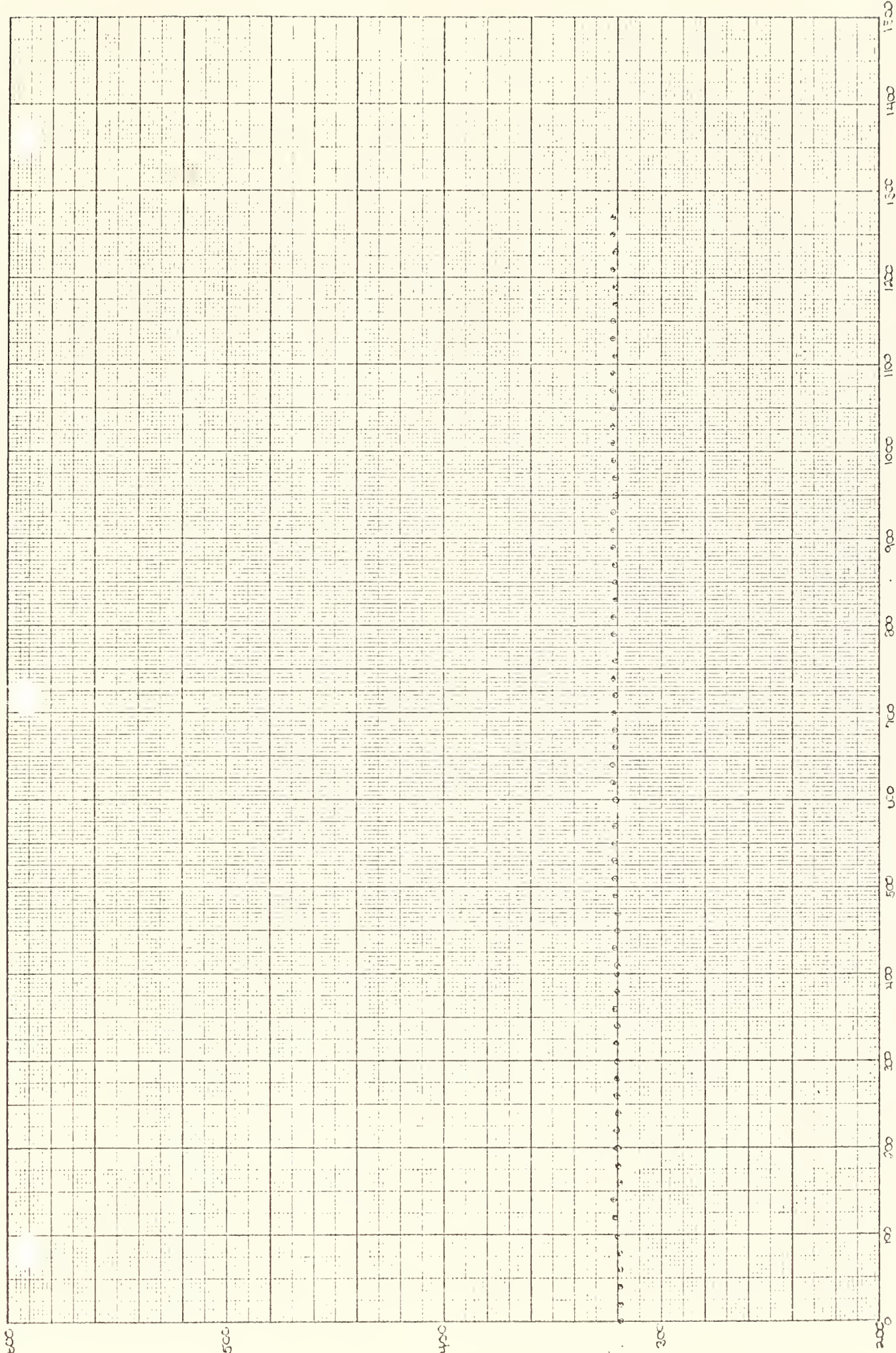


Pressure in PSI - corrected

K-2: 20 X 30 TO THE INCH 47 1242

II B-1141

Pressure in PSI - Corrected



II B-1142

100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500

Pressure in PSI - Corrected

0

20

40

60

80

100

120

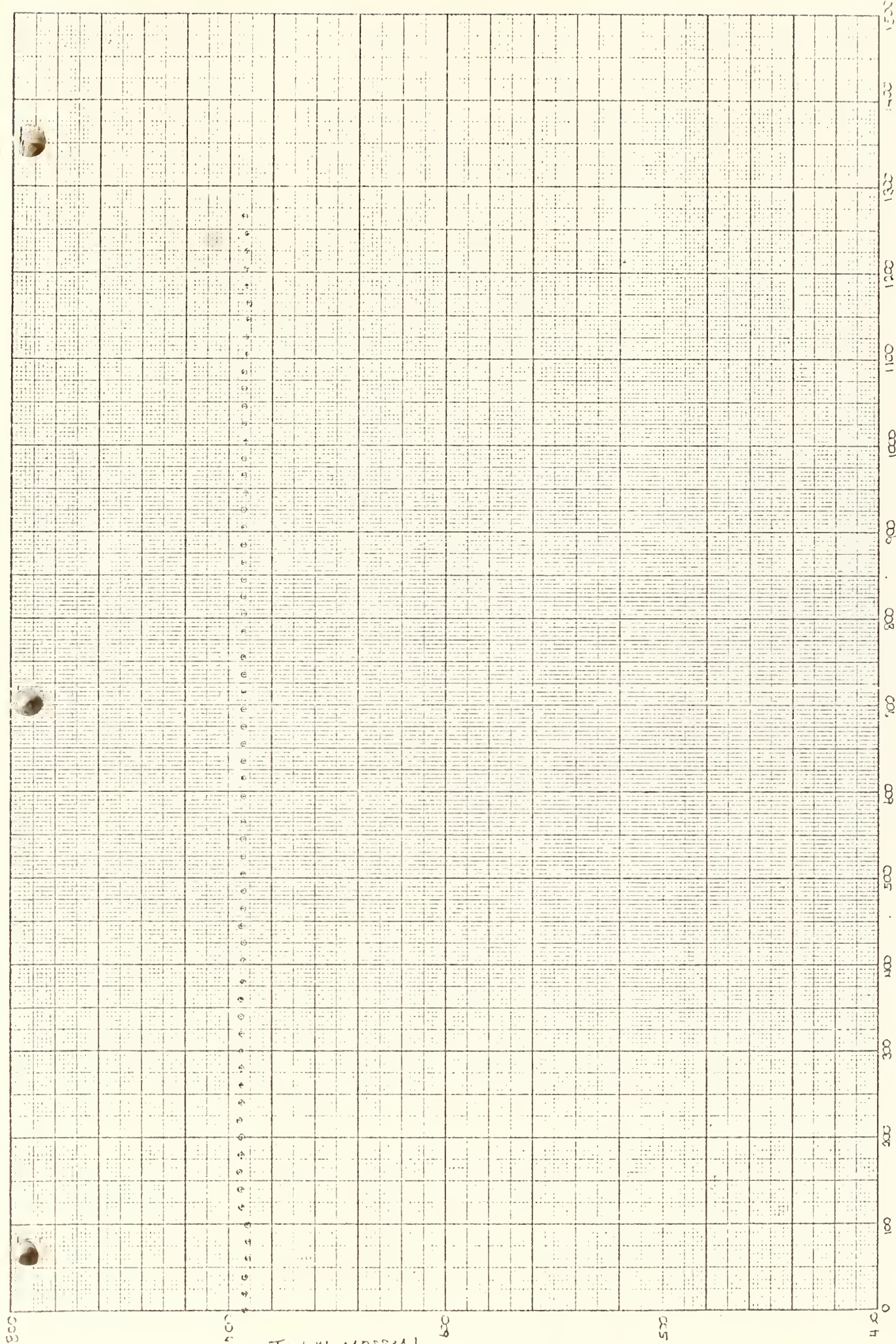
140

160

180

200

LOWER AQUIFER PUMP TEST: SW-10 STATION #2



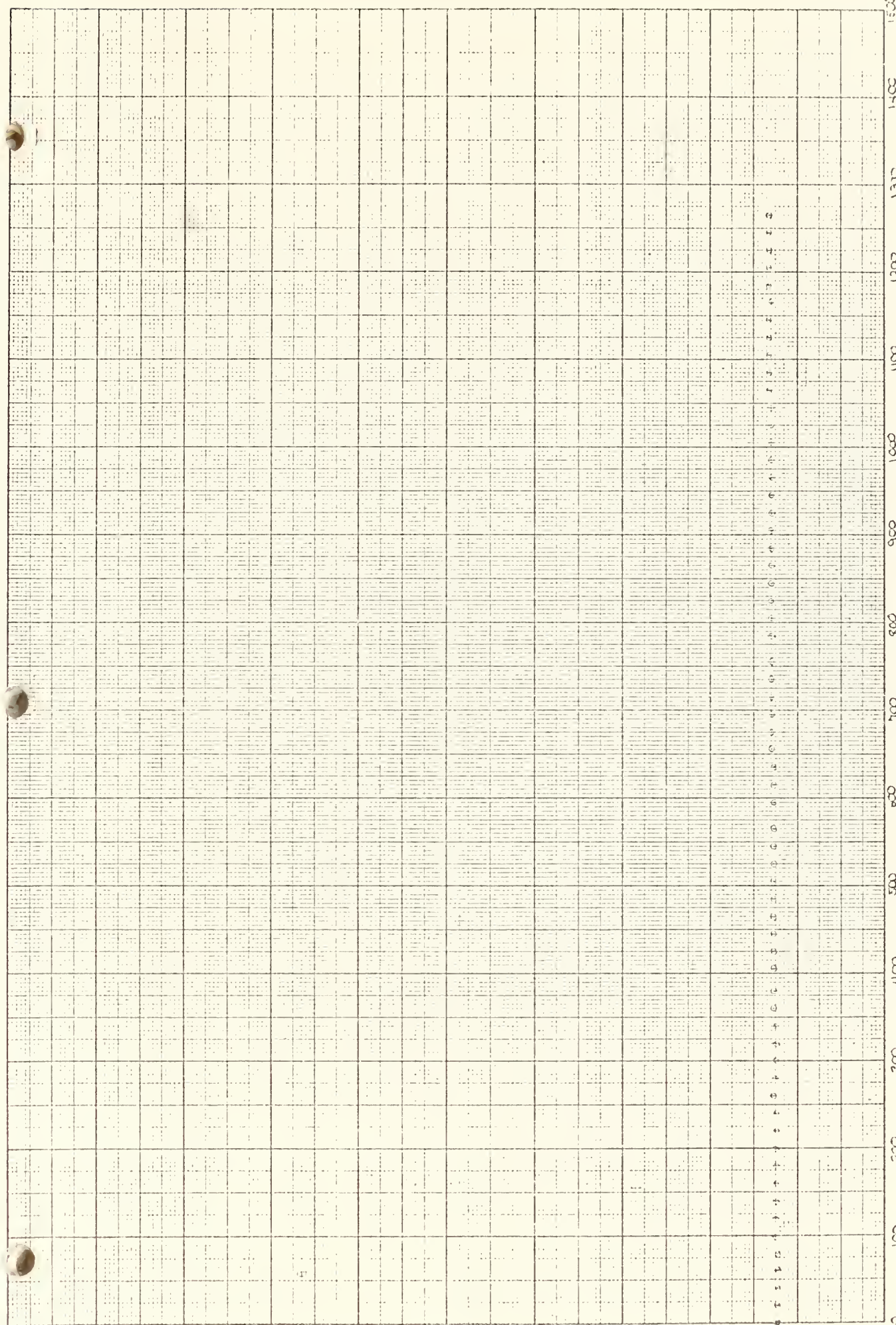
STATION TIME

Pressure in PSI-Corrected

1000
900
800
700
600
500
400
300
200
100
0

11 B-1144

3 # 3185 01-49-10 TEST: 5000 BTU FOR 15000



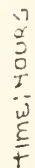
TIME, HOURS

Pressure in PSI - corrected

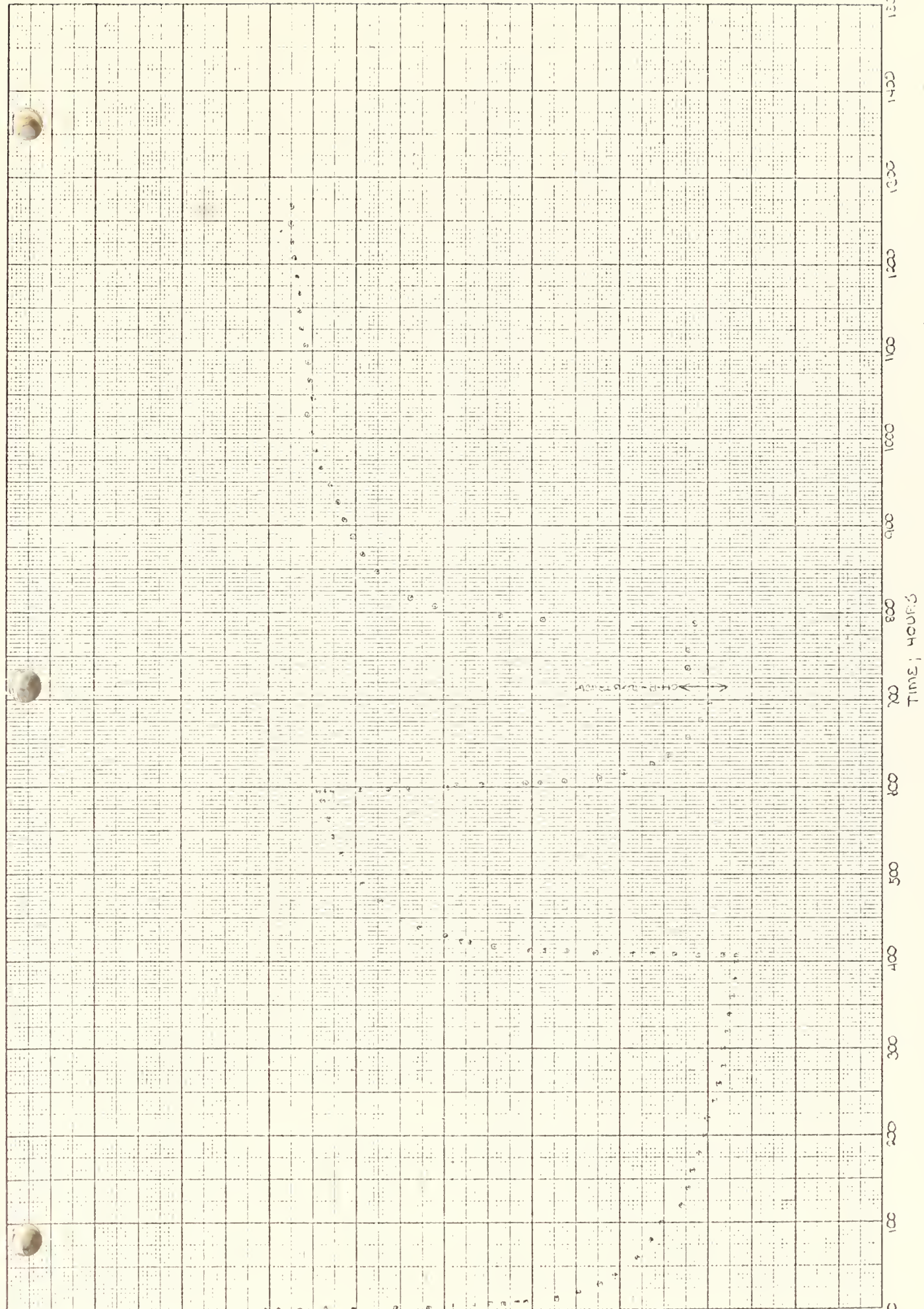
10E 20 X 30 TO THE INCH 47 1242
KAPPA & SONS CO. CHICAGO, ILL.

11 B-1145

Expanded Scale



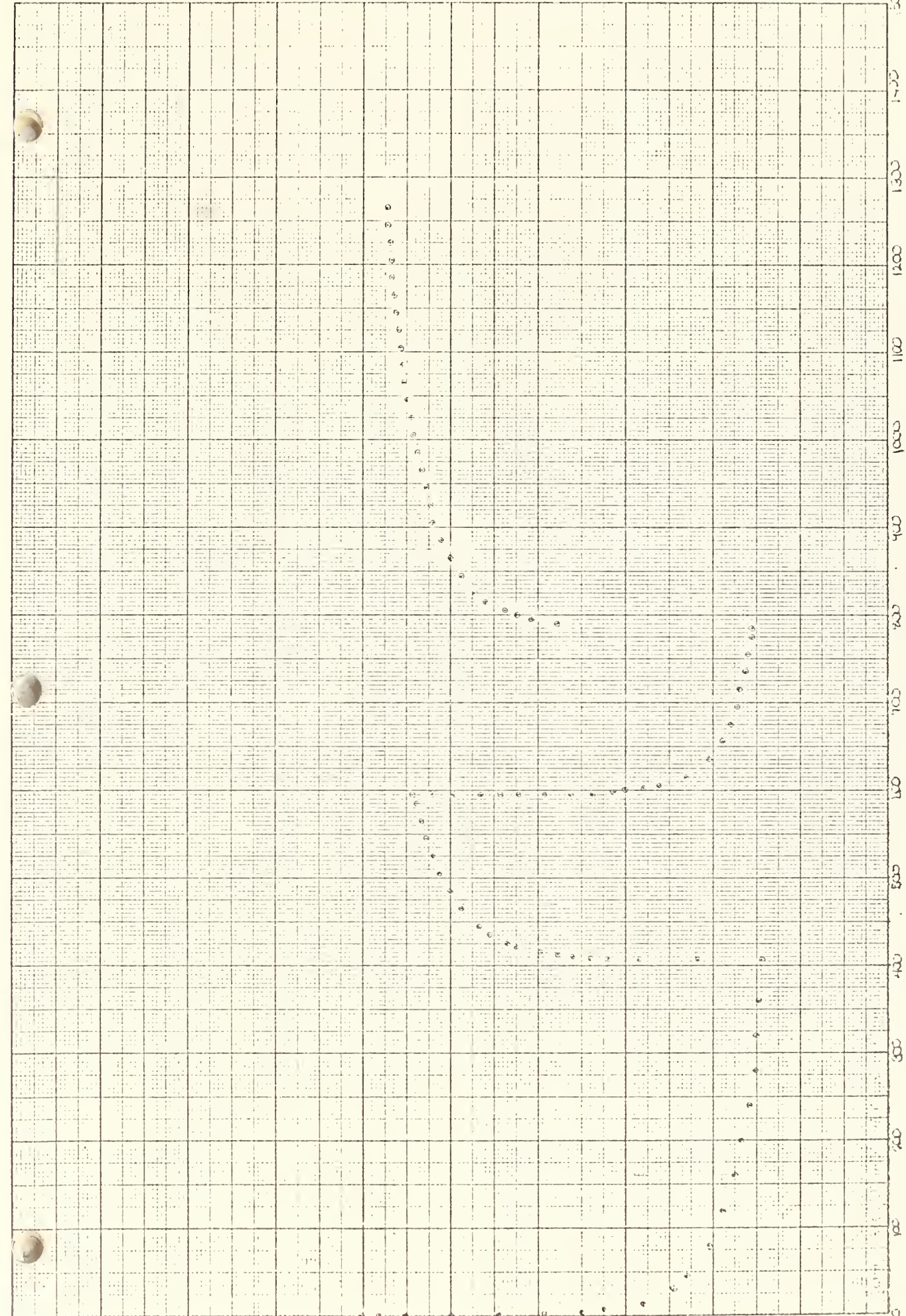
1950-1951 1952-1953 1954-1955 1956-1957 1958-1959 1960-1961 1962-1963 1964-1965 1966-1967 1968-1969 1970-1971 1972-1973 1974-1975 1976-1977 1978-1979 1980-1981 1982-1983 1984-1985 1986-1987 1988-1989 1990-1991 1992-1993 1994-1995 1996-1997 1998-1999 2000-2001 2002-2003 2004-2005 2006-2007 2008-2009 2010-2011 2012-2013 2014-2015 2016-2017 2018-2019 2020-2021 2022-2023 2024-2025 2026-2027 2028-2029 2030-2031 2032-2033 2034-2035 2036-2037 2038-2039 2040-2041 2042-2043 2044-2045 2046-2047 2048-2049 2050-2051 2052-2053 2054-2055 2056-2057 2058-2059 2060-2061 2062-2063 2064-2065 2066-2067 2068-2069 2070-2071 2072-2073 2074-2075 2076-2077 2078-2079 2080-2081 2082-2083 2084-2085 2086-2087 2088-2089 2090-2091 2092-2093 2094-2095 2096-2097 2098-2099 2100-2101 2102-2103 2104-2105 2106-2107 2108-2109 2110-2111 2112-2113 2114-2115 2116-2117 2118-2119 2120-2121 2122-2123 2124-2125 2126-2127 2128-2129 2130-2131 2132-2133 2134-2135 2136-2137 2138-2139 2140-2141 2142-2143 2144-2145 2146-2147 2148-2149 2150-2151 2152-2153 2154-2155 2156-2157 2158-2159 2160-2161 2162-2163 2164-2165 2166-2167 2168-2169 2170-2171 2172-2173 2174-2175 2176-2177 2178-2179 2180-2181 2182-2183 2184-2185 2186-2187 2188-2189 2190-2191 2192-2193 2194-2195 2196-2197 2198-2199 2200-2201 2202-2203 2204-2205 2206-2207 2208-2209 2210-2211 2212-2213 2214-2215 2216-2217 2218-2219 2220-2221 2222-2223 2224-2225 2226-2227 2228-2229 2230-2231 2232-2233 2234-2235 2236-2237 2238-2239 2240-2241 2242-2243 2244-2245 2246-2247 2248-2249 2250-2251 2252-2253 2254-2255 2256-2257 2258-2259 2260-2261 2262-2263 2264-2265 2266-2267 2268-2269 2270-2271 2272-2273 2274-2275 2276-2277 2278-2279 2280-2281 2282-2283 2284-2285 2286-2287 2288-2289 2290-2291 2292-2293 2294-2295 2296-2297 2298-2299 2300-2301 2302-2303 2304-2305 2306-2307 2308-2309 2310-2311 2312-2313 2314-2315 2316-2317 2318-2319 2320-2321 2322-2323 2324-2325 2326-2327 2328-2329 2330-2331 2332-2333 2334-2335 2336-2337 2338-2339 2340-2341 2342-2343 2344-2345 2346-2347 2348-2349 2350-2351 2352-2353 2354-2355 2356-2357 2358-2359 2360-2361 2362-2363 2364-2365 2366-2367 2368-2369 2370-2371 2372-2373 2374-2375 2376-2377 2378-2379 2380-2381 2382-2383 2384-2385 2386-2387 2388-2389 2390-2391 2392-2393 2394-2395 2396-2397 2398-2399 2400-2401 2402-2403 2404-2405 2406-2407 2408-2409 2410-2411 2412-2413 2414-2415 2416-2417 2418-2419 2420-2421 2422-2423 2424-2425 2426-2427 2428-2429 2430-2431 2432-2433 2434-2435 2436-2437 2438-2439 2440-2441 2442-2443 2444-2445 2446-2447 2448-2449 2450-2451 2452-2453 2454-2455 2456-2457 2458-2459 2460-2461 2462-2463 2464-2465 2466-2467 2468-2469 2470-2471 2472-2473 2474-2475 2476-2477 2478-2479 2480-2481 2482-2483 2484-2485 2486-2487 2488-2489 2490-2491 2492-2493 2494-2495 2496-2497 2498-2499 2500-2501 2502-2503 2504-2505 2506-2507 2508-2509 2510-2511 2512-2513 2514-2515 2516-2517 2518-2519 2520-2521 2522-2523 2524-2525 2526-2527 2528-2529 2530-2531 2532-2533 2534-2535 2536-2537 2538-2539 2540-2541 2542-2543 2544-2545 2546-2547 2548-2549 2550-2551 2552-2553 2554-2555 2556-2557 2558-2559 2560-2561 2562-2563 2564-2565 2566-2567 2568-2569 2570-2571 2572-2573 2574-2575 2576-2577 2578-2579 2580-2581 2582-2583 2584-2585 2586-2587 2588-2589 2590-2591 2592-2593 2594-2595 2596-2597 2598-2599 2600-2601 2602-2603 2604-2605 2606-2607 2608-2609 2610-2611 2612-2613 2614-2615 2616-2617 2618-2619 2620-2621 2622-2623 2624-2625 2626-2627 2628-2629 2630-2631 2632-2633 2634-2635 2636-2637 2638-2639 2640-2641 2642-2643 2644-2645 2646-2647 2648-2649 2650-2651 2652-2653 2654-2655 2656-2657 2658-2659 2660-2661 2662-2663 2664-2665 2666-2667 2668-2669 2670-2671 2672-2673 2674-2675 2676-2677 2678-2679 2680-2681 2682-2683 2684-2685 2686-2687 2688-2689 2690-2691 2692-2693 2694-2695 2696-2697 2698-2699 2700-2701 2702-2703 2704-2705 2706-2707 2708-2709 2710-2711 2712-2713 2714-2715 2716-2717 2718-2719 2720-2721 2722-2723 2724-2725 2726-2727 2728-2729 2730-2731 2732-2733 2734-2735 2736-2737 2738-2739 2740-2741 2742-2743 2744-2745 2746-2747 2748-2749 2750-2751 2752-2753 2754-2755 2756-2757 2758-2759 2760-2761 2762-2763 2764-2765 2766-2767 2768



Pressure in PSI - corrected

Time, hours

LOWEST MEASURED POINT 1001 : 11-10 : 11-10 : 11-10



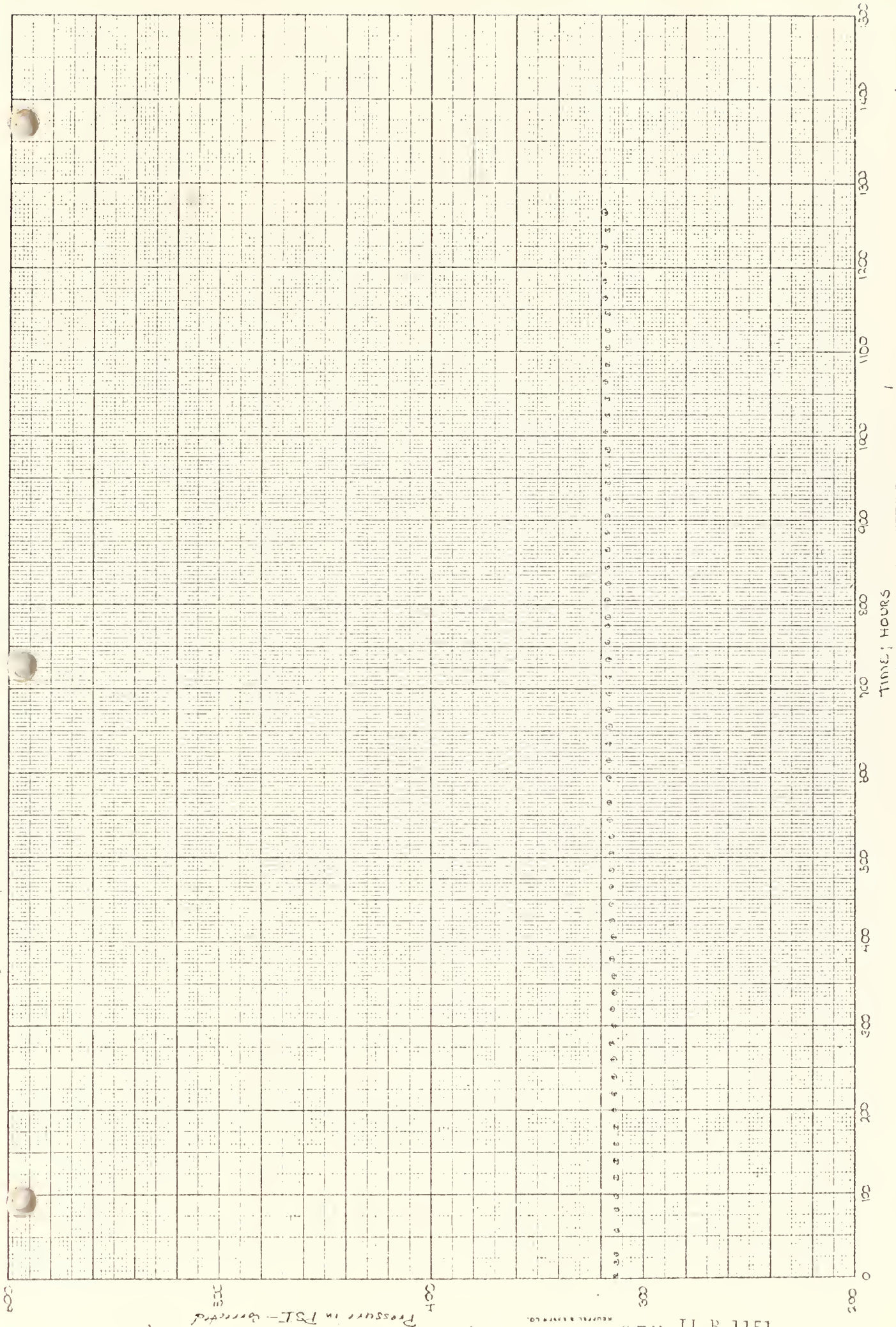
TIME, HOURS

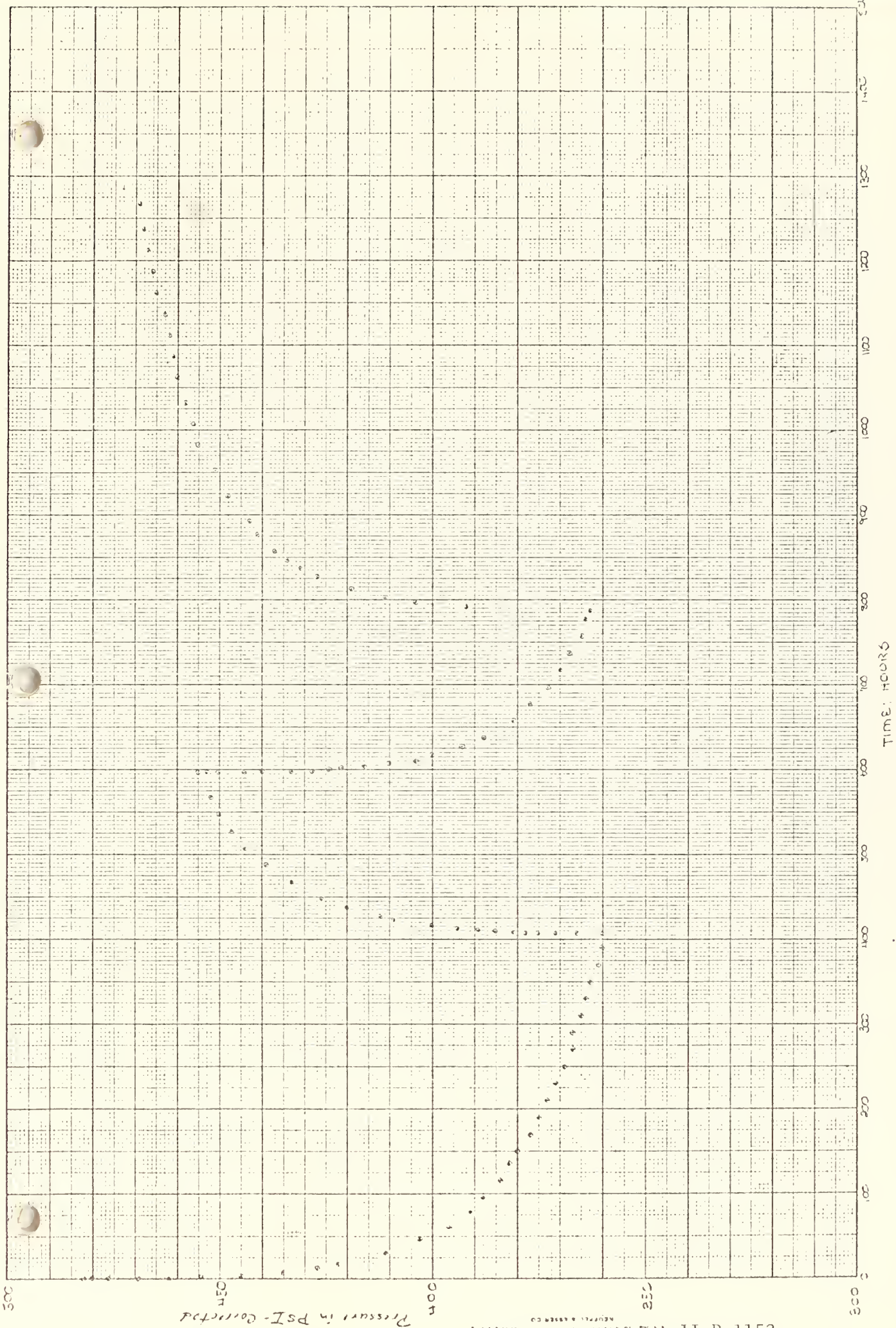
PRESSURE, in PSI - corrected

K&E 20 x 20 TO THE INCH 47 1242

11 B-1150

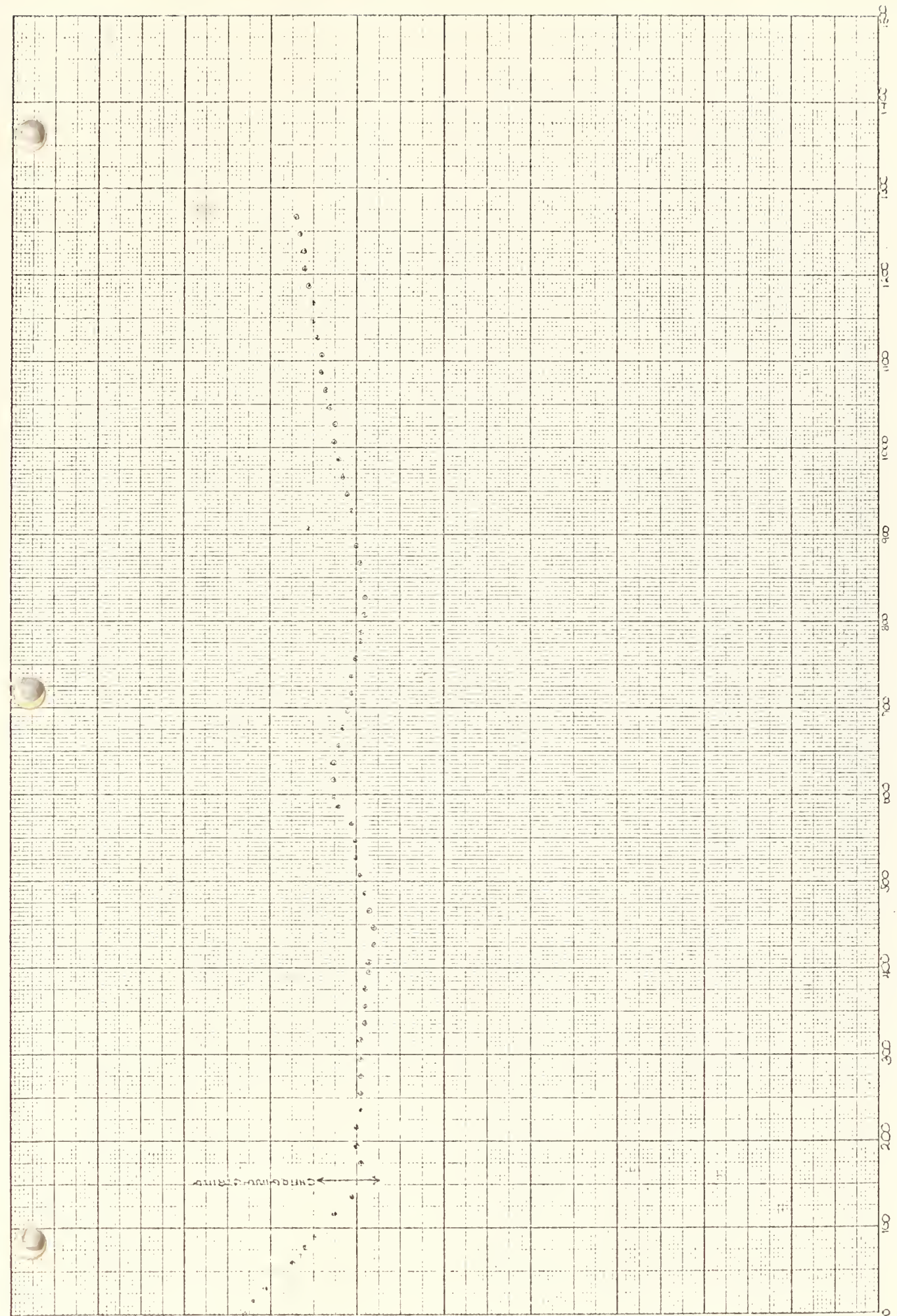
Lower Aquifer Pump Test: At-1C String #3



[illegible]

Pressure in PSI - corrected

47 1242 K.E. 11 B-1152



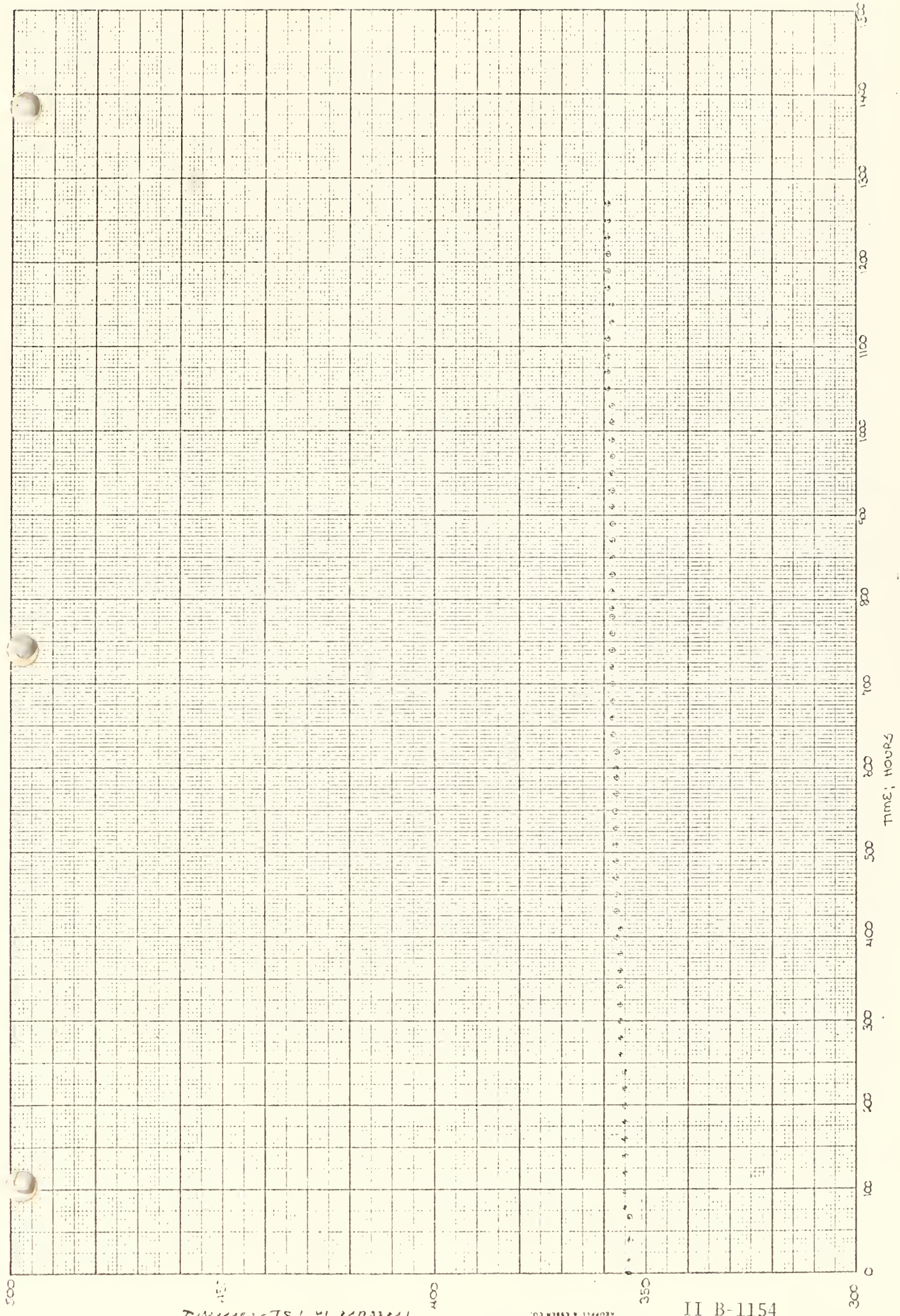
Time, Hours

Pressure in PSI - corrected

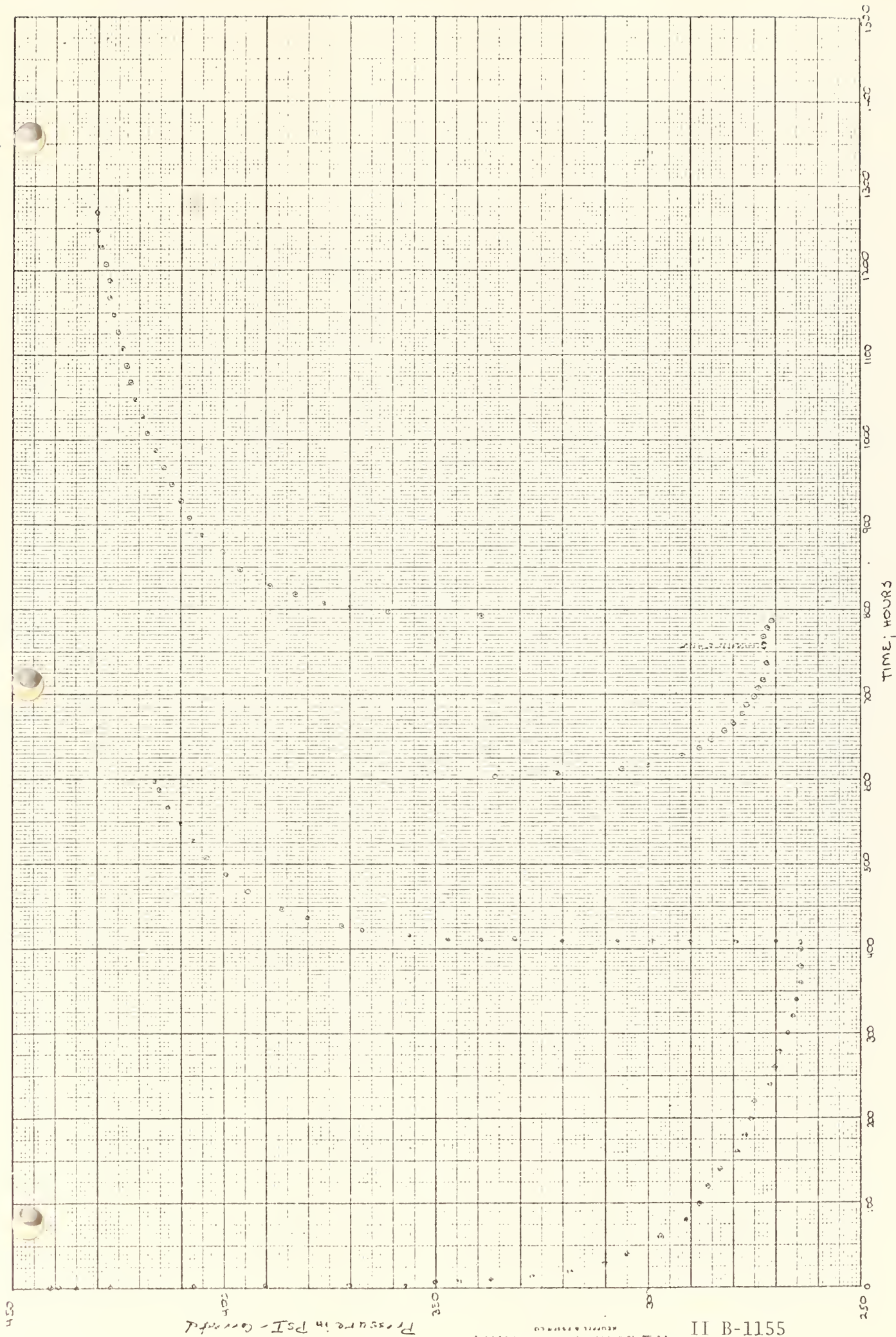
II B-1153

K&E 20 x 20 TO THE INCH 47 1242
REDFIELD & FARM CO.
MADE IN U.S.A.

LOWER EQUIPER PUMP TEST: AT-1A TRAINING #3



LOWER ACQUIFER PUMP TEST: AT-10 D T MIN



KEE 20 X 20 TO THE INCH A7 1242
REPRODUCED BY THE U.S. GOVERNMENT

II B-1155

○
1.1
1

8

50

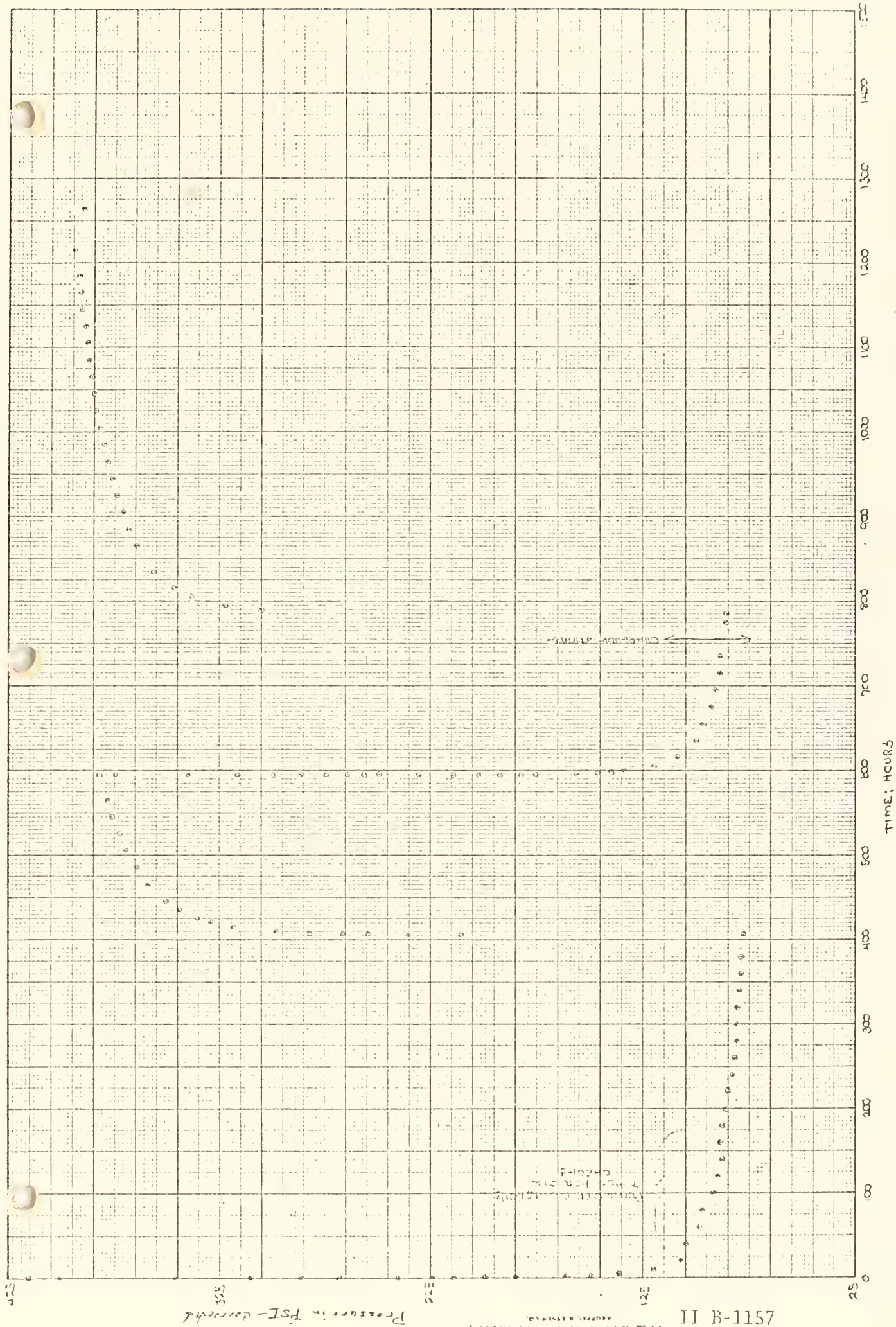
20 x 20 TO THE INCH 47 1242

8

II B-1156

TIME, HOURS

LOWER AQUIFER TEST / AT-1



Lithology

Lower Aquifer Pump Test

AQUIFER DATA
ALLUVIAL WELL PUMP TEST

TABLE II B-55

ALLUVIAL WELL A#1 PRODUCTION 6.11 gpm
 Measured 4-23-75 Starting 1129 hours
 Static Water Level 46.82 ft.

Drawdown		Recovery	
Column #1	Column #2	Column #1	Column #2
time of measurement from 0 = 1129 hours + minutes	drawdown in feet (-) from 0 = 46.82 feet below land surface	time of measurement from 0 = 1309 hours + minutes	recovery in feet (-) from 0 = 46.82 feet below land surface
0	0	0	0
1	0.59	1	.55
2	0.63	2	.62
3	0.675	3	.66
4	0.70	4	.68
5	0.705	5	.70
6	0.715	6	.71
7	0.730	7	.71
8	0.730	8	.72
9	0.730	9	.72
10	0.725	10	.725
12	0.735	12	.73
14	0.740	14	.74
16	0.745	16	.75
18	0.745	18	.75
20	0.745	20	.76
25	0.745	25	.76
30	0.750	30	.76
35	0.750	35	.76
40	0.755	40	.765
45	0.755	45	.77
50	0.755	50	.77
60	0.755	60	.77
70	0.760	70	.77
80	0.765	80	.77
90	0.760	90	.77
100	0.762		
120	0.760		
140	0.760		
160	0.760		
180	0.750		
temperature 12.5°C	conductivity 2200 ohms		

Page 12 of 12
Date: 11/11/2011
Time: 11:11 AM
User: [illegible]

Date	Description	Amount	Balance
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]
11/11/2011	[illegible]	[illegible]	[illegible]

TABLE II B-56
ALLUVIAL WELL A#2 PRODUCTION 6.11 gpm
Measured 4-14-75 Starting 13:05 hours
Static Water Level 14.06 ft.

Drawdown		Recovery	
Column #1	Column #2	Column #1	Column #2
time of measurement from 0 = 13:05 hours + minutes	drawdown in feet (-) from 0 = 14.06 feet below land surface	time of measurement from 15:45 hours + minutes	recovery in feet (-) from 0 = 14.06 feet below land surface
0	0	0	5.72
1	2.8	1	3.0
2	3.25	2	2.15
3	3.7	3	1.79
4	3.93	4	1.59
5	4.03	5	1.40
6	4.15	6	1.27
7	4.29	7	1.16
8	4.37	8	1.18
9	4.47	9	1.12
10	4.56	10	.95
12	4.77	12	.83
14	4.94	14	.75
16	5.04	16	.69
18	5.12	18	.63
20	5.20	20	.58
25	5.28	25	.48
30	5.41	30	.40
35	5.47	35	.33
40	5.55	40	.28
45	5.60	45	.25
50	5.60	50	.21
60	5.58	60	.15
70	5.67	70	.10
80	5.68	80	.05
90	5.69	90	.05
100	5.69	100	.01
120	5.72	120	-.03
140	5.74	140	-.05
160	5.76	160	-.07
180	5.72	180	-.09
200	5.67	200	-.10
220	5.67	220	-.11
240	5.72	240	-.12
average temperature 11.0°C	average conductivity 1300 ohms		

Date	Description	Amount	Balance
1900 Jan 1	To Balance	100.00	100.00
1900 Jan 15	By Cash	50.00	150.00
1900 Jan 30	By Cash	25.00	175.00
1900 Feb 1	By Cash	25.00	200.00
1900 Feb 15	By Cash	25.00	225.00
1900 Feb 28	By Cash	25.00	250.00
1900 Mar 1	By Cash	25.00	275.00
1900 Mar 15	By Cash	25.00	300.00
1900 Mar 30	By Cash	25.00	325.00
1900 Apr 1	By Cash	25.00	350.00
1900 Apr 15	By Cash	25.00	375.00
1900 Apr 30	By Cash	25.00	400.00
1900 May 1	By Cash	25.00	425.00
1900 May 15	By Cash	25.00	450.00
1900 May 30	By Cash	25.00	475.00
1900 Jun 1	By Cash	25.00	500.00
1900 Jun 15	By Cash	25.00	525.00
1900 Jun 30	By Cash	25.00	550.00
1900 Jul 1	By Cash	25.00	575.00
1900 Jul 15	By Cash	25.00	600.00
1900 Jul 30	By Cash	25.00	625.00
1900 Aug 1	By Cash	25.00	650.00
1900 Aug 15	By Cash	25.00	675.00
1900 Aug 30	By Cash	25.00	700.00
1900 Sep 1	By Cash	25.00	725.00
1900 Sep 15	By Cash	25.00	750.00
1900 Sep 30	By Cash	25.00	775.00
1900 Oct 1	By Cash	25.00	800.00

TABLE II B-57
ANALYTICAL SUMMARY
ALLUVIAL WELLS.

#A1 - Drawdown (late data) $T = 67,210$ gpd/ft.

Recovery (early data) $T = 10,082$ gpd/ft.

#A2 - Drawdown (early data) $T = 881$ gpd/ft.

Recovery (late data) $T = 2,688$ gpd/ft.

The range between early and late data analyses is the result of hole effects on the early data in general; the late data of these analyses will be the figure used.

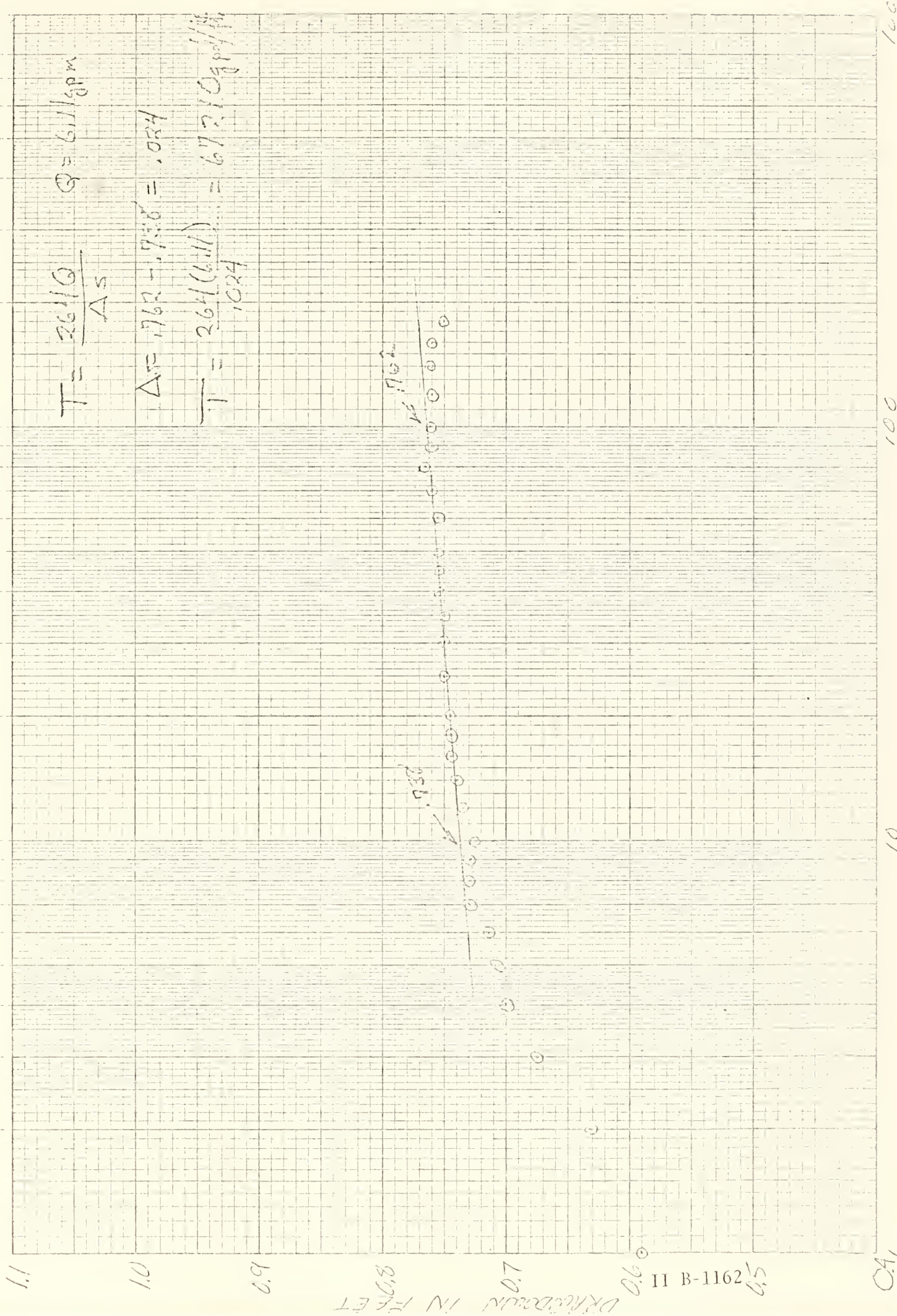
1944
1945
1946

1947
1948

1949
1950

1951
1952

A-1 DRAWDOWN APRIL 23, 1975



A-1 Recovery April 23, 1975

$$t = \frac{2640}{\Delta S}$$

$$Q = 6.119 \text{ PM}$$

$$\Delta S = .877 - .719 = .16$$

$$T = 100 \pm 1.5 \text{ gpm/hr}$$

150

0.9

0.8

0.7

0.6

0.5

II B-1163

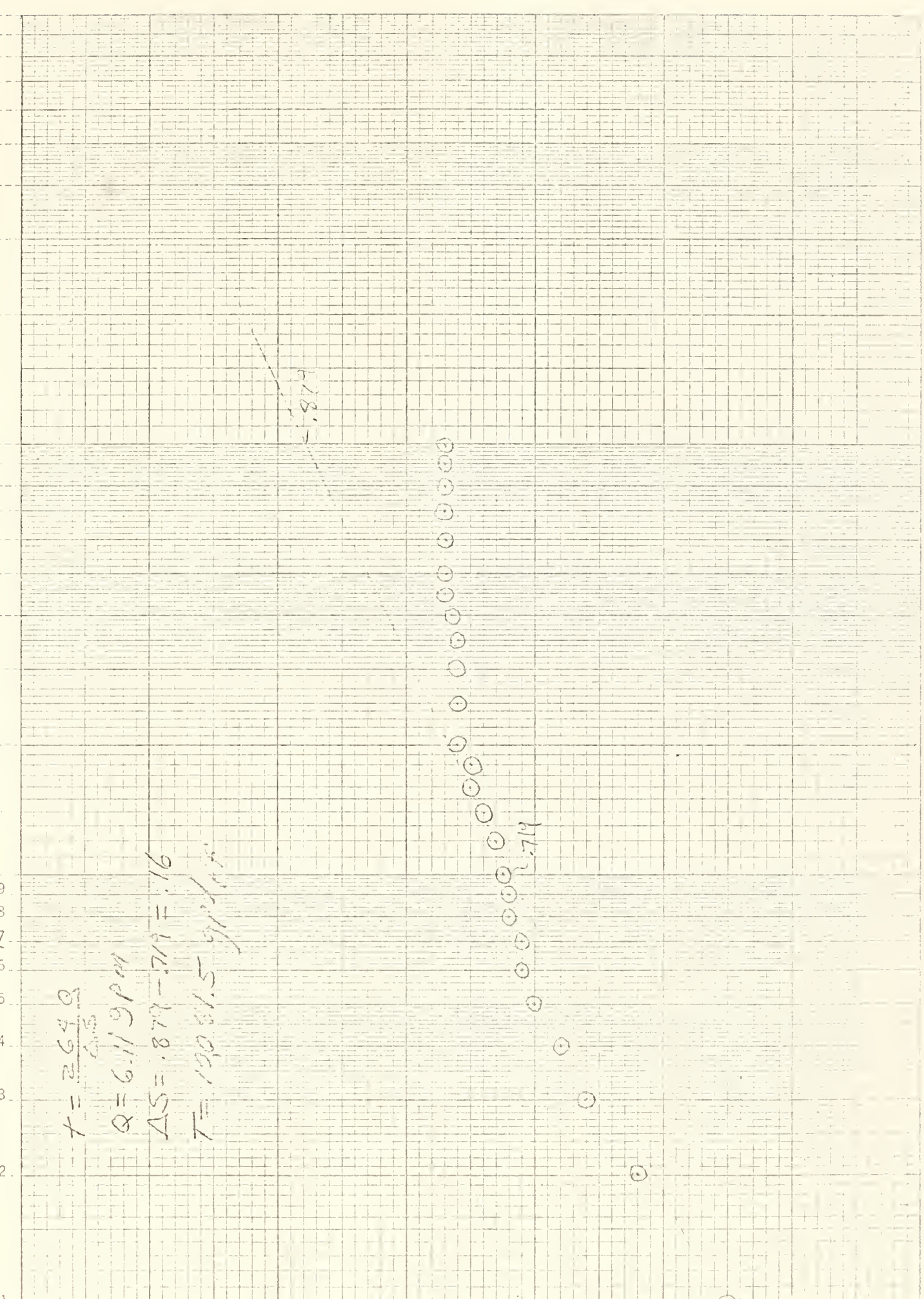
0.4

0.3

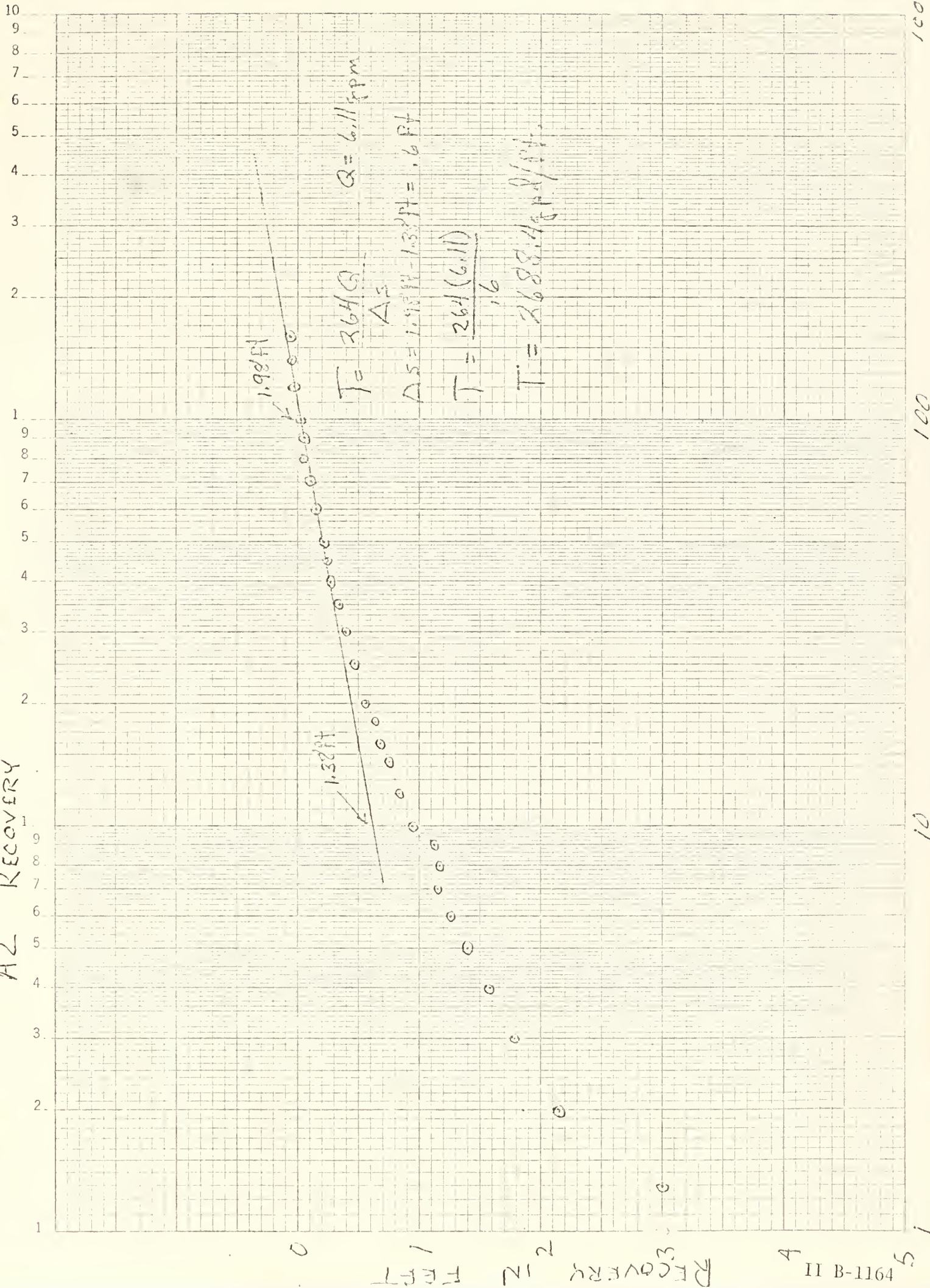
10

100

1000



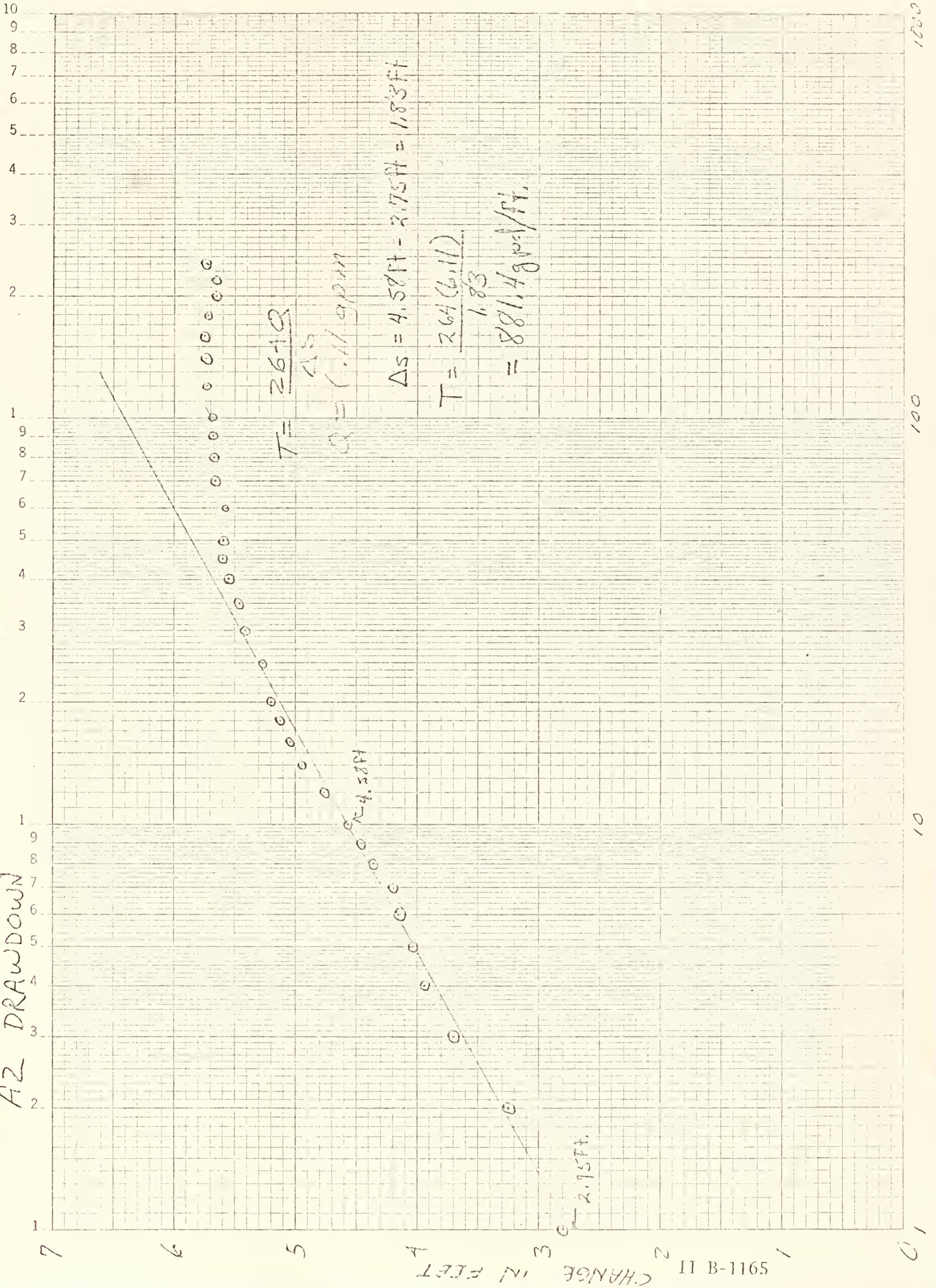
A2 RECOVERY



100
MINUTES SINCE PUMP OFF

1000

AZ DRAWDOWN



J. Maho

A-1

DATE: APRIL 23, 1975 STARTING TIMING: 11:29 A.M.

STATIC WATER LEVEL: 46.82 SAMPLE TAKEN: YES

DRAWDOWN (in feet)

IN	ΔH_2O LEVEL	TEMP.	CONDUCT	GPM	MIN	H_2O LEVEL	TEMP.	CONDUCT.	GPM
0	0.0				90	0.760			
1	0.59				100	0.762			
2	0.63				120	0.760			
3	0.675				140	0.760			
4	0.70				160	0.760	12.5	2200	6.11
5	0.705				180	0.750			
6	0.715				200				
7	0.730				220				
8	0.730				240				

RECOVERY (in feet)

						MIN.	ΔH_2O LEVEL	MIN.	ΔH_2O LEVEL
9	0.730				0	0			
10	0.725				0	0			
12	0.735				1	.55	20	.76	160
14	0.740				2	.62	25	.76	180
16	0.745				3	.66	30	.76	200
18	0.745				4	.68	35	.76	220
20	0.745			6.11	5	.70	40	.765	240
25	0.745				6	.71	45	.77	
30	0.750				7	.71	50	.77	
35	0.750				8	.72	60	.77	
40	0.755				9	.72	70	.77	
45	0.755			6.11	10	.72 ⁵	80	.77	
50	0.755				12	.73	90	.77	
60	0.755				14	.74	100		
70	0.760				16	.75	120		
80	0.765				18	.75	140		



J. Morris

A 2

DATE: APRIL 14, 1975 STARTING TIMING 1.305 Hours

STATIC WATER LEVEL: 14.06 SAMPLE TAKEN: YES

DRAWDOWN (in feet)

IN	ΔH_2O LEVEL-in	TEMP.	CONDUCT	GPM	MIN	H ₂ O LEVEL	TEMP.	CONDUCT.	GPM	
0	0				90	5.69	11.0	1300	6.11	55 gal / 4 min.
1	2.8				100	5.69	11.0	1300	6.11	"
2	3.25				120	5.72	11.0	1300	6.11	"
3	3.7				140	5.74	11.5	1300	6.11	"
4	3.93				160	5.76	11.0	1300	6.11	"
5	4.03				180	5.72	10.5	1300	6.11	"
6	4.15				200	5.67	10.5	1300	6.11	"
7	4.29				220	5.67	10.5	1300	6.11	"
8	4.37				240	5.72				

RECOVERY (in feet)

							ΔH_2O LEVEL	MIN.	ΔH_2O LEVEL
10	4.56				0	5.72	MIN.		
12	4.77				1.3	3.0	20	.58	160 - .07
14	4.94				2	2.15	25	.48	180 - .09
16	5.04				3	1.79	30	.40	200 - .10
18	5.12				4	1.59	35	.33	220 - .11
20	5.20				5	1.40	40	.28	240 - .12
25	5.28	11.5	1250		6	1.27	45	.25	
30	5.41			6.11	7	1.16	50	.21	
35	5.47				8	1.18	60	.15	
40	5.55	11.0	1300	6.11	9	1.12	70	.10	
45	5.60				10	.95	80	.05	
50	5.60	11.0	1300	6.11	12	.83	90	.05	
60	5.58				14.33	.75	100	.01	
70	5.67	11.0	1300	6.11	16	.69	120	-.03	
80	5.68	11.0	1300	6.11	18	.63	140	-.05	

II B-1167



II B-10 LITHOLOGIC LOGS

The lithologic logs present a description of rock types encountered in a core hole. The detail of description varies with depth and operation. In most cases, however, the lithology is described from drill cuttings on ten-foot intervals above the "A" groove. In the lower zones, the lithology is described from cores on one-foot intervals.

In addition to providing a means for describing lithology, the litholog presents data such as information on structural dip, joints, fractures, and general rock quality data. These data are entered in the lithologic log at the appropriate depth.

The final lithologic logs for the following wells are included in this section of the Third Quarterly Report:

AT-1a	SG-10
SG-1	SG-11
SG-6	SG-17
SG-8	SG-18
SG-9	SG-19

For information on lithologic logs compiled for other wells, refer to the Well Summary Table II B-1.

LOGS CONSIDERED SENSITIVE

ASK PERMISSION OF AOSS TO SEE LITH. LOGS

